

ECM group

REVISED FEASIBILITY STUDY

Redwood Oil Company Bulk Plant
455 Yolanda
Santa Rosa, California

prepared for

Redwood Oil Company
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Rohnert Park, CA 94928

January 24, 2006

ECM group

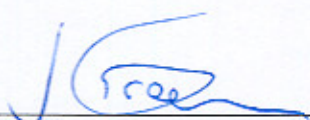
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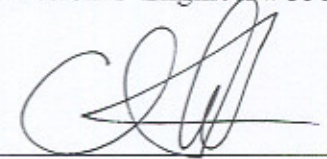
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455 Yolanda
Santa Rosa, California

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Executive Summary

The purpose of this Revised Feasibility Study is to assess the impacts of the release at the site, to define appropriate and relevant clean-up goals, to evaluate the most appropriate remediation technology alternatives for additional corrective action, and to outline a strategy for monitoring and evaluation of remedial action effectiveness.

Soil and groundwater at the site are impacted by petroleum hydrocarbons as a result of releases from fuel storage and piping systems formerly located at the site. The initial fueling system consisted of aboveground storage tanks with above- and below-grade piping. Since 1981, the fuel storage and conveyance systems has utilized underground storage tanks (USTs) and below grade piping. USTs were removed in 1999/2000 and a limited remedial overexcavation was conducted at that time. In 2001, a Soil Vapor Extraction (SVE) system, a Ground Water Extraction (GWE) system and an air sparge (AS) system were installed at the site. Operation of the SVE system continued until August 2003. Operation of the AS system was discontinued in 2005. The GWE system is currently in operation.

Significant impacts have been documented to soil and groundwater to depths up to 180 ft below ground surface. Site history information and deep zone assessment data establish that a former domestic well servicing the bulk plant property generated drawdown and provided a direct conduit for shallow contamination to reach deeper water zones. The current remediation system addresses impacts to shallow soil and groundwater. This feasibility study reassesses the operation of the current remediation system and also evaluates remediation strategies that address the vertical extent of impacts.

For the deeper zones, four remedial options were selected for evaluation, as follows:

- Option One: Expand the existing GWE extraction system to extract groundwater impacted at greater depths;
- Option Two: In-Situ Chemical Oxidation
- Option Three: Enhanced Bioremediation by oxygen injection
- Option Four: Monitored Natural Attenuation (MNA)

This feasibility study documents that the UST removal, the former SVE system, and the

currently-operating GWE system have functioned as intended in the shallow zone. It is recommended that the GWE system continue to operate in the shallow zone. The Feasibility Study also documents that Option Four (MNA) is the most cost-effective and technologically feasible of the four options proposed for the deeper zone. Options other than MNA are not economically feasible; other options could increase contaminant migration to the deeper zone; the other options are unnecessary since no receptors are present, and no plans exist for development of groundwater resources near or downgradient of the release.

**Revised Feasibility Study
455 Yolanda Avenue, Santa Rosa, California**

1.0 Assessment of Impacts

1.1 Site History

The following site history information was obtained from Peter Van Alyea and Bob Barbieri of Redwood Oil Company, Ali Molavi of Petroleum Maintenance Company, and ECM Group (ECM) and Redwood Oil Company (ROC) files. The facility is located at 455 Yolanda Avenue, Santa Rosa, California (Figure 1, Appendix A).

The property was previously operated as a bulk fuel facility by H. R. Gantner, Inc. The facility was constructed in the 1940's or 1950's. The facility had at least four large above-ground storage tanks (ASTs), approximately 10,000 gallons each, and several smaller ASTs for fuel products storage. The facility had transfer and loading racks, and dispenser islands, with above- and below-grade piping. Operations records, spill records, housekeeping procedures, and other details regarding the H.R. Gantner operation were not available for inclusion in this document. An airphoto of the original facility is shown as Figure 2, Appendix A.

The site was leased by ROC on January 1, 1979, and was purchased by ROC on January 27, 1982. The ASTs were decommissioned from fuel storage and twelve 12,000 gallon underground fuel storage tanks (USTs) were installed at the site by ROC in 1981 (Figure 3, Appendix A).

The ROC tanks were tightness tested in September and October, 1988.¹ The underground storage tanks were tested tight. The precision tests identified failures in two submersible pump gaskets and a product line joint. File correspondence indicates that repairs were made in the fuel delivery system. Retests were conducted on portions of the system during December, 1988.²

All twelve tanks were tested tight in February, 1990 and in February, 1991.

In 1989, twenty soil borings were drilled around the tanks and fuel delivery system by Earthtec,

¹ Petro Tech, 1988, Precision Underground Tank System Test Results, reports from Petro Tech to Redwood Oil Company, 1988.

² Petro Tech, 1988, Precision Underground Tank System Test Results, reports from Petro Tech to Redwood Oil Company, December, 1988.

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Ltd., of Roseville, California.³ Ground water samples were not collected from the borings. Hydrocarbons as gasoline, diesel or motor oil were detected in soil samples from nine borings. Hydrocarbons as benzene, toluene, ethylbenzene or xylenes (BTEX) were detected in soil samples from ten of the borings.

In June, 1990, two underground storage tanks were excavated and removed from the site. The tanks were located along the north wall of the plant warehouse building (Figure 3, Appendix A). One of the tanks was a 550-gallon oil tank, and the other was a 1,000-gallon waste oil tank. Both tanks were single-wall steel tanks. Hydrocarbons were detected in soil samples collected from the bottom and sidewalls of the excavation at concentrations up to 2,100 parts per million (ppm).

Several phases of subsurface investigations have been conducted at the site. The following table lists over 120 wells and borings completed at on- and off-site locations.

Well/boring I.D.	Installation Date	Well/boring I.D.	Installation Date
MW-1 through MW-4	1/91	G-1 through G-4	10/96
MW-5, MW-7, MW-8	6/91	G7 through G-10	10/96
V-1, V-2	6/91	G-11 through G-17	4/98
MW-9	10/96	GP1 through GP33	1/00
MW-5A	10/96	TSP-1 through TSP-5	5/00
MW-10	4/99	PMC-1 through PMC-6	9/99
MW-11 through MW-20	5/00	GWE-1 through GWE-16	3/01
MW-21 through MW-24	2/01	AS-1 through AS-14	3/01
MW-24 through MW-30	1/02	SVE-1 through SVE-12	5/01

Analytic results for soil samples are listed in Table 7, Appendix B. Historic ground water levels and well construction details are shown in Tables 1 and 2, Appendix B. Historic analytic results

³ Earthtec. Ltd., 1989, Preliminary Contamination Study, Redwood Oil Bulk Plant, 455 Yolanda Avenue, Santa Rosa, California, June 2, 1989, 18 pages and 4 appendices.

for groundwater are reported in Tables 3 through 6, Appendix B. Well sampling locations are shown on Figure 5, Appendix A. Sampling locations for geoprobe and boring installations are shown in Figures 3 and 6, Appendix A.

In April, 1992, a soil vapor extraction (SVE) test was conducted at the site.⁴ The pilot test measured extraction rates and influence using two wells near the tank field, V-1 and V-2.

During the week of August 11, 1995, Redwood Oil and the Santa Rosa Fire Department (SRFD) observed a line leak near the (former) center front fuel island (Figure 3, Appendix A). Petroleum Maintenance Company of Santa Rosa, California performed field tests, located the leak, and removed the asphalt, concrete and soil above a series of subsurface fuel lines near the leak. On August 22, 1995, Redwood Oil uncovered a rusty hole in the unleaded fuel line. On August 23, 1995, representatives of Redwood Oil and Sierra Environmental Services (SES) met on-site with Eileen Kortas of the SRFD. As directed by the SRFD, SES collected two soil samples beneath the fuel line. The soil samples contained up to 2,500 (ppm) total purgeable petroleum hydrocarbons as gasoline (TPPH[G]); 3,500 ppm total petroleum hydrocarbons as diesel (TPH[D]), and BTEX compounds.

ROC acquired the adjacent property at 459 Yolanda Avenue (east of the former facility) in the mid-1990's and developed plans for a new fuel storage and cardlock facility. The current site configuration (Figures 4 and 5, Appendix A) reflects the new bulk plant layout, completed in 2000.

Ten USTs were removed in 1999/2000 and a remedial overexcavation was conducted at that time. Approximately 3,500 cubic yards (CY) of impacted soil were removed from the site. Analytical laboratory results for soil samples collected during the excavation are tabulated in Table 7 (Appendix B). Sampling locations are shown on Figure 7 (Appendix A).

In 1999, a plume migration control system was installed as the first phase of GWE for the facility. Six extraction wells were installed along the south boundary of the site. Ground water extraction pumps were installed in each, and the extracted water was routed through carbon

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Sierra Environmental Services, 1992, Soil Vapor Pilot Test Report, Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa, California, August 6, 1992, 7 pages and 2 appendices.

filters prior to discharge to the sanitary sewer. This plume migration control system was later incorporated into the larger GWE system at the facility, and is still in operation.

In 2001, a Soil Vapor Extraction (SVE) system, a Ground Water Extraction (GWE) system and an Air Sparge (AS) system were installed at the site. A plan view of the remedial systems is shown on Figure 8, Appendix A.

The SVE system was connected to 12 extraction wells, some of which were also used for GWE. Between July 2001 and August 2003, approximately 1,100 kg of hydrocarbons were removed from impacted soil by the SVE system. Operation of the SVE system continued until August 2003, when a proposal to discontinue operation due to low hydrocarbon vapor recovery rates was approved by the Regional Water Quality Control Board, North Coast Region.

The GWE system currently extracts impacted groundwater from 16 wells at rates between 1 and 3 GPM. The wells are installed to an average depth of 30 ft bgs. The extraction wells are located in and around the former source area, and along the south property line (PMCS wells).

The AS system consisted of 14 air injection points located in and around the former source area. Each point utilized a ceramic sparge point tip for injection of compressed air into the ground water table. Operation of the AS system was discontinued in 2005.

In December, 2004, Redwood Oil Company transferred the bulk plant operation at 455 Yolanda to Redwood Coast Petroleum. Redwood oil Company relocated its offices to 50 Professional Drive, Suite 100, Rohnert Park, California. There are no changes in the Responsible Parties for the site.

1.2 Hydrogeologic Characteristics

1.2.1 Current and Potential Beneficial Uses

The site is located in the California Regional Water Quality Control Board, North Coast Region. The site is located in the Russian River Hydrogeologic Unit, in the Middle Russian River Hydrologic Area, and in the Santa Rosa Hydrologic Subarea. Existing beneficial uses for waters

of the Russian River Hydrogeologic Unit, identified in the 1993 (revised 2001) Water Quality Control Plan for The North Coast Region, are: Municipal and Domestic Supply, Agricultural Supply, Industrial Service Supply, Industrial Process Supply, Groundwater Recharge, Navigation, Hydropower Generation, Water Contact Recreation, Non-Contact Water Recreation, Commercial and Sport Fishing, Aquaculture, Warm Freshwater Habitat, Cold Freshwater Habitat, Estuarine Habitat, Wildlife Habitat, Migration of Aquatic Organisms, and Spawning, Reproduction, and/or Early Development.⁵ No potential beneficial uses were identified in the Water Quality Control Plan.

1.2.2 Geologic and Topographic Setting

The Redwood Oil Bulk Fuel Facility is located in the City of Santa Rosa, Sonoma County. Adjacent properties in the site vicinity are a mix of commercial, retail, and residential. Surface topography in the site vicinity is nearly level. The nearest surface water body is the Colgan Creek Flood Control channel, about 1/3 mile to the west. Waters of the Colgan Creek Flood Control Channel flow into Santa Rosa Creek.

Cross section Figures 9 through 13, Appendix A, show formations underlying the site, based on boring logs. Low-permeability clays, interspersed with higher-permeability formations containing varying proportions of silt and sand, predominate in the upper 30 ft. Between approximately 30 and 140 ft bgs, formations of consolidated and semi-consolidated siltstone/sandstone of low to moderate permeability underlie the site. South of the site at this depth are formations of silty sand and sandy silt of varying permeabilities. Below approximately 140 ft are higher-permeability formations of sands and gravels. There do not appear to be consistent or continuous aquitards limiting groundwater mobility from one vertical zone to another.

Recent gradient maps have been compiled for the last 4 to 5 years for the shallow water bearing zone and the zones at approximately 75 ft, 150 ft, and 180 ft bgs. These maps are included as Figures 16 through 19, Appendix A. Groundwater at all depths flows in a consistent southerly to southeasterly direction at gradients varying between approximately 0.005 and 0.05 ft/ft.

⁵

North Coast Regional Water Quality Control Board, December 9, 1993, Water Quality Control Plan For The North Coast Region.

1.3 Contaminant Characteristics

1.3.1 Contaminants of Concern

The following contaminants have been identified in soil and/or ground water at the site: hydrocarbons as gasoline, diesel, kerosene, and motor oil; benzene, toluene, ethylbenzene, and xylenes; and oxygenates, particularly MTBE, TBA, and TAME. Relatively small concentrations (up to 27 ppb) of 1,2 dichloroethane have been detected in site wells. Historic analytic results are tabulated in Tables 3 through 7 (Appendix B).

1.3.2 Impacts to the Site and Surrounding Area

Extent of Impacts to Soil

Soil in the area surrounding the former USTs is impacted with petroleum hydrocarbons. Analytic results for soil are tabulated in Table 7, Appendix B. Soil sampling locations are shown on Figures 3 and 6, Appendix A.

An estimate of the mass of hydrocarbons remaining in soil in the unsaturated zone and the smear zone has been made based on the January 2000 geoprobe data and sidewall samples from the previous UST removals and corrective action excavations. Computations used in the estimate are shown in Appendix E. Taking into account the approximately 1,100 kg of hydrocarbons removed by the SVE system, it is estimated that approximately 2,600 kg of impacted hydrocarbons remain in shallow site soil. With allowances for fluctuations in the sampling results, the remaining impacted soil volume may be as low as 1,500 kg, or as high as 4,000 kg. Most of the contaminants are located adjacent to the former north and south tank clusters (Figure 3, Appendix A).

Lateral and Vertical Extent of Contaminants in Ground Water

The lateral and vertical extent of impacts to groundwater is shown graphically in Figures 9 through 15 (Appendix A). Historic concentrations for selected monitoring wells are shown on Graphs 1 through 36 (Appendix C).

Overview of Conditions in the Shallow Zone

Eight shallow zone monitoring wells are located in or near the source zone: V-1, MW-1, MW-2, MW-3, MW-4, MW-10, MW-21, and MW-22. The graphs in Appendix C display gasoline and MTBE concentration vs time for these wells. The UST removal and corrective action excavations were completed in 1999 and 2000, and the SVE/GWE/AS systems were operated starting in 2000. The graphs indicate that concentrations of the gasoline and MTBE contaminants have declined in 6 of the 8 wells near the former source area (V-1, MW-1, MW-2, MW-4, and MW-10). In the remaining two wells, MW-3 and MW-22, contaminant concentrations have remained stable. MTBE concentrations have declined in MW-21 (shallow sampling port) and have remained constant in MW-22 (shallow port).

The monitoring data illustrates that the UST removals, corrective action excavations, operation of the SVE system, and the current GWE system have functioned as intended. Contaminant concentrations in shallow monitoring wells are expected to continue to decline as the GWE system continues operation. The plume migration control wells inhibit offsite migration of impacted groundwater.

Overview of Conditions in the Deeper Zones

Two domestic wells, labeled DW-1 and DW-2, were formerly located on and adjacent to the bulk plant at 455 Yolanda. Well DW-1 serviced the 459 Yolanda parcel, immediately east of the original bulk plant site. Well DW-2 was the water supply well for the 455 Yolanda site from 1974 through the late 1990's. Well DW-1 was destroyed in 1993, and DW-2 was destroyed in 1999. The total depth of DW-2 was 180 ft. Well logs for DW-1 and DW-2 are included as Appendix F.

Well DW-2 was known to be impacted with fuel hydrocarbons in the late 1990's. Well water use was reduced to the minimum possible, while arrangements were completed for connection to the City municipal supply system. Site assessment data establishes that pumping from DW-2 over many years resulted in drawdown of impacted groundwater from the former shallow source zones to deeper groundwater zones. In MW-21, the multi-level well installed adjacent to former DW-2, groundwater is impacted with high concentrations of hydrocarbons and oxygenates. The

most serious impacts are at the approximate 75 ft bgs depth, a zone of consolidated sandstone/siltstone of relatively low permeability. Concentrations of contaminants at all depths are much lower in multi-level well MW-22, located approximately 130 ft downgradient of former domestic well DW-2 (Figures 9 through 15, Appendix A). Well DW-1 is not associated with deep water zone impacts, based on assessment data from the nearest multi-level well.

1.3.3 Potential Impacts to the Surrounding Area

An April 30, 1998 report by ECM summarizes the results of a domestic well search in the area.⁶ The report includes the results of a 1995 domestic well survey. Twelve domestic wells were located within one-quarter mile of the site. An additional well survey was conducted in December 2000 to confirm the locations of wells within 500 ft of the site.^{7,8} Seven domestic water supply wells were located in or near the area of the survey. Of the seven wells located, four were no longer active. Of the three active wells, one well (the well located at 2917 Petaluma Hill Road) was located approximately 700 feet east of the eastern boundary of the site. The two remaining active wells were located at 468 Yolanda Avenue (approximately 500 ft downgradient of former DW-2) and at 380 Yolanda Avenue (approximately 550 ft down/crossgradient of former DW-2). Locations of the two DW wells are shown on Figure 3, Appendix A. Both wells have been removed from service and replaced with connections to the municipal supply system.

There are no remaining active wells in the vicinity of the plume. Staff at the City of Santa Rosa and the Sonoma County Water Resources Department have verified that there are no plans to develop groundwater resources in the vicinity of Yolanda Avenue.^{9,10} The City of Santa Rosa

⁶ ECM, April 30, 1998, Domestic Well Research, Redwood Oil Bulk Fueling Facility, 455 Yolanda Ave., Santa Rosa, CA, 5 pages and 2 appendices.

⁷ ECM, February 8, 2001, Sensitive Receptor Survey, Redwood Oil Bulk Fueling Facility, 455 Yolanda Ave., Santa Rosa, CA, 5 pages and 3 appendices.

⁸ ECM, May 2, 2001, Sensitive Receptor Survey Addendum Redwood Oil Bulk Fueling Facility, 455 Yolanda Ave., Santa Rosa, CA, 3 pages and 2 appendices.

⁹ 2006, Sonoma County Water Resources Agency, Personal Communication with Pam Jean, Staffer, to Jim Green, ECM Group.

¹⁰ 2006, City of Santa Rosa Public Works Department, Personal Communication with Dave Osbourne, Staffer, to Jim Green, ECM Group.

General Plan Land Use Diagram shows light industrial zoning on Yolanda Avenue, with mixed residential and commercial uses on the nearby Burt Road, Kawana Springs Road, and Santa Rosa Avenue.

2.0 Conceptual Site Model

This site conceptual model has been developed based on the site investigations, site history, and the site topography and geology. The site conceptual model may be revised with new data collected during subsequent activities at the site.

Soil and groundwater at the site have been impacted as a result of leaking UST systems. A GWE system, extracting shallow groundwater, is currently in operation at the site. An SVE system was formerly in operation and extracted approximately 1,100 kg of hydrocarbons from soil. An estimated 1,500 to 4,000 kg of hydrocarbons remains in site soil (Appendix E).

The depth to shallow groundwater at the site is approximately 15 ft bgs. The groundwater flow direction is southeasterly for shallow groundwater and for all deeper zones of contamination. A portion of the GWE system at the site is for plume migration control.

A domestic well, designated DW-2, was formerly located onsite (Figure 3, Appendix A). Pumping from this well created drawdown for impacted groundwater from shallow to deeper zones. The highest concentrations of contaminants in the area surrounding DW-2 are at a depth of about 75 ft, in consolidated sandstone/siltstone of relatively low permeability. Elevated concentrations of oxygenates and hydrocarbons are also present at about 180 ft bgs. These elevated concentrations of contaminants in the deep zones are confined to a small area adjacent to former DW-2. Concentrations of contaminants at all depths are much lower in multi-level well MW-22, located approximately 130 ft downgradient of former domestic well DW-2.

Soil in the shallow zone, to a depth of approximately 30 ft bgs, consists of low-permeability clays, interspersed with higher-permeability formations containing varying proportions of silt and sand. Between approximately 30 and 140 ft bgs, formations of consolidated and semi-consolidated siltstone/sandstone of low to moderate permeability underlie the site. Below

approximately 140 ft are higher-permeability formations of sands and gravels. There do not appear to be significant aquitards limiting groundwater mobility from one vertical zone to another.

Two water supply wells located downgradient/crossgradient of the plume have been removed from service. No receptors or potential receptors are identified in the area of the plume or potentially downgradient of the plume.

3.0 Cleanup Goals

As required by Cleanup and Abatement Order No. R1-2005-0106, this feasibility study will evaluate cleanup and abatement actions that provide, at a minimum: (1) cleanup to background levels, (2) cleanup to levels attainable through application of best practicable technology, and (3) cleanup to protective water quality criteria levels. Ultimately, the cleanup goal at this site is to attain the Groundwater Water Quality Objectives (WQOs), where feasible, for hydrocarbons listed in Exhibit 1 of Cleanup and Abatement Order No. R1-2005-0106.

Constituent	Water Quality Objective (ppb)	Constituent	Water Quality Objective (ppb)
Gasoline	5.0	Ethylbenzene	30
Diesel	100	Xylenes	20
Kerosene	100	Methyl tert-butyl Ether	5
Motor oil	1	Tert-butyl Alcohol	12
Benzene	0.15	Lead	2
Toluene	40		

No receptors are known to exist in the vicinity of the site. No wells are in use, and no changes to the current site uses are being planned or considered by the City of Santa Rosa.

4.0 Feasibility Study

Shallow Groundwater Zone

An analysis of conditions in the shallow zone is provided in Section 1.3.2. Contaminant reduction trends in the monitoring well database verify that the UST removal, the SVE system operation, and the current GWE system have functioned as intended. Concentrations in soil have been reduced to the extent feasible by excavation. Contaminant concentrations in shallow zone monitoring wells have declined and are expected to continue declining as the GWE system continues operation. The plume migration control portion of the GWE system mitigates offsite migration of impacted groundwater.

It is recommended that the GWE system continue to operate in the shallow zone. The remainder of this feasibility study will focus on impacts to the deeper zones.

Deep Groundwater Zones

As described in earlier sections of this report, the deep groundwater zone is impacted by dissolved hydrocarbons, particularly at 75 ft below grade, and at depths to about 180 ft below grade. The source for these impacts is identified as the former domestic well for the property. Remedial options considered for the deep groundwater zones are: GWE; in-situ chemical oxidation; enhanced bioremediation by the addition of oxygen; and Monitored Natural Attenuation (MNA).

Cost analyses in each section are engineering estimates based on preliminary vendor quotes and are not intended as precise cost estimates or bids for system installation.

4.1 Option 1: Groundwater Extraction

Under this option, extraction wells would be drilled to various depths in the impacted zone near the former location of well DW-2. The extracted groundwater would be treated and discharged to the sanitary sewer system, or to the storm drain system under NPDES permit. A carbon filtration system exists onsite to meet sewer district constraints for the current shallow GWE system. Due to the quantity of groundwater expected at greater depths, and to higher contaminant concentrations, the carbon filtration system would have to be expanded. Additional

treatment components could include an air stripper, with an incinerator or furnace for added vapor destruction, or with additional carbon vessels, or other treatment technologies. Additional trenching and conveyance conduits would be required to provide electric power to pumps and to return extracted groundwater to the existing treatment pad.

The impacted vertical zone, which is of relatively small lateral extent, is limited to the area adjacent to former DW-2. A practical approach to GWE for the deeper zones would be to install a cluster of extraction wells in the impacted zone, with:

- five to six 6-inch diameter extraction wells to 40 ft bgs, screened from 5 ft bgs to 40 ft bgs;
- one 6-inch diameter extraction well to 90 ft bgs, screened from 60 ft bgs to 90 ft bgs;
- one 6-inch diameter extraction well to 155 ft bgs, screened from 125 ft bgs to 155 ft bgs;
- one 6-inch diameter extraction well to 185 ft bgs, screened from 155 ft bgs to 185 ft bgs;

The additional shallow extraction wells would be necessary to minimize further drawdown of impacted groundwater from the shallow zone. The extraction wells installed at the deeper zones would be duplicating the drawdown effects that generated the original impact to the deep zones. Since there is still impacted shallow groundwater near the former source area, additional shallow water extraction and redundant well coverage would be needed to minimize exacerbating the problem. A schematic of this type of GWE system is included as Figure 20, Appendix A.

Groundwater yield is unknown in the most heavily contaminated zone (approximately 75 ft bgs). This is an area of consolidated siltstone/sandstone of relatively low permeability. The zone below 140 ft bgs is a high permeability groundwater zone, capable of yielding a large supply of groundwater. It is estimated that the three deep wells in a system for deep GWE would yield between 30 and 100 GPM, 24 hours a day and 7 days per week. The additional shallow wells would yield 5 to 20 GPM.

The advantages of GWE in the deep zone are:

1. This is a known, standardized technology, effective for removing hydrocarbon mass and reducing plume migration.

2. This site has a sanitary sewer discharge permit, and an operating system for the shallow zone.
3. Because the deep groundwater zone has little or no secondary source soil, it is expected that only relatively small quantities of hydrocarbons are sorbed to soil, and that therefore fewer 'flushes' of impacted groundwater may be required to remove contaminants from the soil-groundwater interface.

The disadvantages of GWE are:

1. Installation and operation costs are high.
2. It is unknown how long pumping would have to be sustained in order to show positive results. For planning, a period of five years should be used. The Lawrence Livermore Laboratory report critiqued GWE as a remedial method by noting that numerous volumes of extracted groundwater were typically needed to achieve the desired results at many sites.
3. It cannot be guaranteed that GWE would not draw further contaminants into the deeper zones. Contaminants were originally drawn into the deeper zones via domestic well pumping. Installation of a cluster of extraction wells of different depths, combined with several shallow zone extraction wells, may decrease this possibility. The threat of increased or exacerbated drawdown conditions remains a significant negative factor for this alternative.
4. The discharge of treated groundwater from a deep zone GWE system would be subject to the local utility district constraints. The NPDES permitting process requires the use of the sanitary district discharge when it is available. The local sewer district has already permitted a GWE system at this site, and would expand the permit for a deep zone system. Fees for discharge from a deep zone GWE system with these flow rates would be excessive. In addition, the GWE system operation is subject to fluctuations in the sewer district's capacity to accept the discharge. The long-term ability of the district to accommodate the effluent stream may change with plant capacity.
5. The treatment of groundwater will result in waste products. Carbon filters require changeouts to maintain effluent quality, and furnaces or oxidizers use either electricity or natural gas as fuel. An electric furnace could not process the projected flow rate at an efficient cost.

Engineering Estimate, Deep Zone GWE System -

Well Installation	\$165,000
Pumps	\$30,000
Additional Infrastructure	\$35,000
Airstripper Equipment	\$65,000
Furnace/Incinerator option	\$95,000
Carbon Filter option	\$26,000
System Assembly	\$75,000
Annual Groundwater Disposal Fees to Sewer District at \$4.99/1,000 Gallons, Discharging 30 to 100 GPM	\$80,000 – \$260,000/yr
Consumables, carbon or natural gas	\$25,000 - \$75,000/yr
Annual O&M Costs:	\$60,000 - \$100,000/yr
Total Costs (5 years operation):	\$1,316,000 - \$2,661,000

4.2 Option 2: In-Situ Chemical Oxidation

Chemicals such hydrogen peroxide, persulfate, potassium permanganate, and ozone can directly destroy petroleum hydrocarbons via chemical reaction. This can be done very efficiently and successfully in laboratory or ex-situ settings. A number of vendors and systems exist for injecting these chemicals into the subsurface for in-situ hydrocarbon remediation. The main limitation is radius of influence, as the oxidizing compounds are so reactive they break down extremely quickly. They can also react preferentially with metals or other organic matter in soil, preventing them from affecting the target hydrocarbons. Typically, injection wells are installed and chemicals are injected under pressure, either during a series of discrete events or by means of a system that continually injects ozone or other oxidative chemicals. Safety is an important consideration when handling these reactive substances. Injection must be done slowly enough to prevent rapid uncontrolled heating or explosions in the subsurface.¹¹

¹¹ Interstate Technology & Regulatory Council, 2005, Technical and Regulatory Guidance for In Situ Chemical Oxidation of Contaminated Soil and Groundwater, 2nd Edition, January 2005.

Typically, such systems are injected to remediate hydrocarbon impacts in shallow zones of contamination. Use of these methods in deeper zones leads to increased expense and application difficulties. Ozone breaks down under pressure. The pressure required to deliver ozone to zones at 75 ft or deeper would probably destroy most or all of the ozone prior to delivery to the target depth in the subsurface. Therefore, this discussion will be limited to the injection of oxidizing compounds such as hydrogen peroxide, persulfate, or potassium permanganate.

An oxidation system would consist of a number of 2-inch diameter injection wells targeting different depths. Periodically, solutions of the chemicals would be injected under pressure. Typically, the maximum effective lateral radius of influence at sites with sandy, higher-permeability soils is no greater than 20 to 25 ft, and some overlap is required for effective application of oxidants. Effective radius of influence in the low permeability shallow zone, and in the somewhat low permeability zone at 75 ft bgs, is probably no more than about ten feet. Therefore, wells would have to be installed in a 15-foot grid to provide sufficient overlap. Wells targeting the more permeable zone at 140 to 180 ft bgs could be installed on a somewhat larger grid pattern. Determination of an optimal grid pattern cannot be determined without field installation of injection points and monitoring wells, application of oxidants in a pilot study, and monitoring the results. The economic analysis below illustrates that a pilot study for this methodology is not warranted.

Vertical radius of influence is related to screen length of the injection wells. It would be necessary to install wells in clusters, with one well in each cluster installed at least every 20 to 25 vertical feet. A grid-pattern would be established, covering an area extending approximately 75 ft downgradient, and approximately 35 ft cross-gradient, of former domestic well DW-2. A well cluster would be installed at each grid point, with wells installed to depths of 50, 70, 90, 110, 130, 150, 160, and 180 ft in each cluster. A minimum of 30 or more grid points would be required, generating a minimum of 240 injection wells. Assuming that oxidants were injected in a series of discrete events, a minimum of three or more injection events would be required for each well. This plan would address only the heavily contaminated zone immediately adjacent to and downgradient of former well DW-2. To address a larger lateral area, additional grid points and injection clusters would have to be installed. A schematic of this treatment option is included as Figure 21, Appendix A.

The advantages of chemical oxidation are:

1. This remedial method could be done in a series of discrete events, with testing following each event. Results would be immediately available, and work could cease as soon as results were favorable.
2. With regulatory approval, an effort to remediate the most heavily contaminated zone, at approximately 75 ft bgs, could be attempted prior to attempts to remediate deeper zones. This phased approach could help focus the application events and rates to match the variations in stratigraphy at this site.

The disadvantages of chemical oxidation are:

1. The system proposed here would only address remediation of the area within about 75 ft downgradient, and 35 ft crossgradient, of former DW-2. To address a wider area, additional injection well clusters would have to be installed.
2. The effective radius of influence is small compared to the impacted area. A large number of injection well clusters is required to apply the oxidation compounds.
3. Rebound effects are common with oxidation treatment technologies. Project costs climb quickly with additional oxidation events.
4. Applications of oxidants in the varied stratigraphy at this site will encounter large variations in the effective radius of influence. Additional applications will be necessary to initiate and maintain contaminant reduction trends.
5. The injection system would require an injection well permit from EPA. Pressurized injection could mobilize contaminants away from the treatment zone both laterally and vertically.

Engineering Estimate, Deep Zone Oxidant Application -

Installation of 240 wells as described above, approximately 28,000 ft of 2-inch diameter wells, at \$35/ft	\$990,000
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Injection equipment at \$3,000/day, estimate 80 days to inject into all wells, estimate 4 injection events/well, 320 days @ \$3,000/day	\$960,000
Oxidant chemicals at \$1.00/gallon, 2,000 gal/day, 320 days	\$640,000
Project management, analytical testing, rebound monitoring	\$180,000
Total Costs:	\$2,770,000

4.3 Option 3: Enhanced Bioremediation by Oxygen Injection

Oxygen supply is a critical factor limiting the effectiveness of natural biodegradation. Enhanced bioremediation would use some form of oxygen enhancement to speed natural processes. For planning purposes, 10 to 15 years of operation may be estimated for an enhanced bioremediation system.

There are many vendors and processes that inject oxygen or install oxygen releasing compounds using various techniques. For all of these processes, effective radius of influence is a key consideration. Because oxygen is not as reactive as oxidation chemicals, the radius of influence of oxygen injection can be estimated at a larger value than for injection of reactive chemicals. However, oxygen can disperse from the injection site and can be consumed in other natural processes without contributing to site remediation.

Several techniques are typically used to attempt to evaluate the effectiveness of this remedial method. These techniques include: chemical analysis of groundwater to measure concentrations of constituents such as dissolved oxygen, nitrates, iron, and sulfates; plate counts of bacteria present in impacted water; laboratory bench tests involving injection of oxygen into a sample of impacted groundwater; and small-scale in-situ pilot studies. At a site with complex stratigraphy, involving contamination at different vertical zones and in different soil types, it is not likely that a field study would yield sufficient data to calculate the time required for site clean-up. For the

engineering estimate prepared for this option, an operational span of 15 years will be used.

One remedial oxygen injection technique calls for the installation of injection wells, with oxygen placed in pressurized tanks at each wellhead and injected slowly over time at a pre-determined rate. Oversized well vaults are used to hold the tanks. Approximately 30 lateral locations would be required at each vertical zone to cover the plume area near former domestic well DW-2. Each location would have a cluster of injection wells installed at 50, 70, 90, 110, 130, 150, 160, and 180 feet below grade, for a total of 240 wells. Pressurized oxygen tanks with diffusers would then be placed at each wellhead, and oxygen would be released into the subsurface over time through the injection wells. The well clusters required for this remedial option are similar to the those shown on Figure 21 (Appendix A) for oxidant injection.

Advantages of Enhanced Bioremediation:

1. This system used less infrastructure than remedial methods with piping to each well cluster. Each wellhead and injection cluster operates independently of the others.
2. Depending on the oxygen source and review of EPA, an injection permit may not be necessary.
3. No wastes are produced by this system, as opposed to the by-products of the treatment technologies required for GWE.

Disadvantages of Enhanced Bioremediation by Oxygen Injection:

1. The varied stratigraphy at this site will result in variable results in vertical and lateral directions. Preferential dispersion paths may develop for the released oxygen. Preferential dispersion may also drive contaminants vertically and laterally away from the treatment zone.
2. The effectiveness of this method is difficult to evaluate without installing numerous additional monitoring wells at vertical and lateral locations.
3. An estimate of the application volume for oxygen is problematic, due to variations in stratigraphy at the site. Variable effective radii will be encountered.

4. This methodology does not provide capture or retention of impacted groundwater, so the impacted plume is not treated outside the effective radius of the clusters that are installed. To treat the entire impacted area, the number of clusters would need to be greatly increased.

Engineering Estimate, Enhanced Bioremediation by Oxygen Injection:

Installation of 240, 2-inch diameter wells, approximately 28,000 ft of 2-inch diameter wells at \$35/ft	\$980,000
Oxygen tanks and diffusers, 120 well clusters at \$4,500/each	\$540,000
System installation costs, well vault construction, project management	\$140,000
O&M Costs, 15 years operation at \$40,000/year	\$600,000
Total Costs:	\$2,260,000

4.4 Option 4: Monitored Natural Attenuation

Monitored Natural Attenuation (MNA) refers to the reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives.¹² Natural attenuation processes include a variety of physical, chemical and biological processes that, under favorable conditions, reduce the mass, toxicity, mobility, volume, and/or concentration of contaminants in soil and/or groundwater. These processes include sorption, volatilization, hydrodynamic dispersion, and biodegradation. For petroleum hydrocarbons, biodegradation is the most important (and preferred), attenuation mechanism since it is the only natural process that results in actual reduction in the mass of

¹²

2004, EPA, How To Evaluate Alternative Cleanup Technologies For Underground Storage Tank Sites, EPA 510-B-94-003, EPA 510-B-95-007, EPA-R-04-002, revised May 2004.

petroleum hydrocarbon contamination.

In evaluating the potential effectiveness of MNA, the following factors should be considered:

1. Comprehensive site characterization, as reflected in a site conceptual model, should be completed.
2. The source of contamination should be removed. Free product should be removed to the extent feasible.
3. Historic soil and groundwater data should be used to evaluate whether there is a meaningful trend of decreasing contaminant mass or concentration over time. Additionally, hydrogeologic and geochemical data should be used to evaluate whether natural attenuation processes are active, and to estimate degradation rates.
4. Adequate controls should be in place to ensure that there is no current or potential threat to receptors.
5. An effective plan should be in place for long-term monitoring of MNA effectiveness.
6. There should be a contingency plan in the event that MNA fails to perform as anticipated.

The site has been adequately characterized, as detailed in earlier sections of this feasibility study. Figure 17 (Appendix A) shows the flow direction of the plume at the 75 ft depth. This is substantially the same location, size and direction for the impacted plume at all depths beneath the initial shallow zone. Contaminant concentrations for deeper zones are also shown graphically in Figures 10 through 15, Appendix A. Concentrations for all contaminants, at all depths, decrease rapidly with distance from the source area. For samples collected outside the original area of impacts near former DW-2, analyte concentrations are stable or declining (Graphs 22 through 36, Appendix C).

Two water supply wells located downgradient/crossgradient of the plume have been removed from service. No receptors or potential receptors remain in the area of the plume. Staff at the City of Santa Rosa and the Sonoma County Water Resources Department have verified that there are no plans to develop groundwater in the vicinity of Yolanda Avenue. The City of Santa Rosa

General Plan Land Use document for 20-year development along Yolanda Avenue shows mixed business and light industrial zoning. Mixed density residential use is present along Kawana Springs Road north of Yolanda Avenue, and south of the site along Burt Road.

The EPA has released a plume modeling program (BIOSCREEN) which simulates remediation through natural attenuation at petroleum fuel release sites.¹³ The software, programmed in the Microsoft Excel spreadsheet environment and based on the Domenico analytical solute transport model, has the ability to simulate natural processes such as advection, dispersion, adsorption, and aerobic decay as well as anaerobic reactions that have been shown to be the dominant biodegradation processes at many petroleum release sites.

The site release has been modeled using BIOSCREEN to evaluate the effectiveness of natural attenuation at the site. In modeling the release in the vertical zones, beneath the initial shallow groundwater depth, the following assumptions and simplifications were made:

1. It was assumed that since DW-2 has been destroyed, there is no longer a mechanism for significant vertical migration of impacted groundwater. It was assumed that impacted groundwater migrates laterally at approximately the same depth it had reached when DW-2 was deactivated. This assumption is supported by site data. Since 1999, when DW-2 was destroyed, contaminant concentrations in MW-21, the source well, have not increased. Further, the only location where downward vertical migration of contaminants occurred was in the area adjacent to former DW-2, as evidenced by much lower concentrations in deeper sampling ports in the other downgradient monitoring wells.
2. Bioscreen modeling runs were made for constituents at various depths. For the purpose of each individual modeling run, the assumption was made that there was relatively little interaction, via groundwater transport or other mechanism, with groundwater at other depths. As a simplification, each modeling run was treated as an isolated plume. Boring and well data establish that there are no significant aquitards in the subsurface at this site, and that there is some degree of connectivity between groundwater zones at various depths.
3. The Bioscreen model assumes that groundwater migration began at a discrete time with a discrete mass of source material. It is more probable that the source was continuously

¹³

1997, EPA, BIOSCREEN Natural Attenuation Decision Support System, User's Manual Version 1.4, July 1997

supplied (leaking) for a number of years and then was cut off in 1999. The model predicts both the rate of contaminant migration and the rate of decrease of source material. The beginning of the decrease in source material mass can be dated to 1999, but the beginning of contaminant migration probably started many years earlier.

4. Estimates of soluble mass in source soil for each zone are gross estimates and were calculated only for use in the model. Insufficient data exists to make accurate estimates of contaminant mass for each deep zone. Therefore, estimates of time required to reduce source mass as generated by the model contain multiple degrees of potential error.

The Bioscreen modeling results, with detailed explanations, are presented in Appendix D. The following is a summary of the results.

Modeling Run 1: MTBE at 75 ft depth.

MTBE attenuation modeling results are presented for time-spans of 6 years, 20 years, and 50 years, with an assumed solute half-life for MTBE of 5 or 10 years. Representative data from MW-21, MW-22, and MW-23 was used to calibrate the model. Current data corresponds most closely with 20 year model predictions. The model supports the hypothesis that MTBE biodegradation is occurring at the site, because predicted values for the 'no degradation' model are consistently higher than current values in monitoring wells. Current values in monitoring wells correspond reasonably well with predicted values, after 20 years, for 1st order biodegradation, with a 5 or 10 year solute half-life value for MTBE. The 50 year model can be considered a predictor of conditions 20 to 30 years in the future. The 50-year model predicts decrease of MTBE concentrations in the source zone, with slightly elevated concentrations at a distance of 150 to 300 ft from the site. Overall plume size and length predicted by the 50-year model is slightly longer than current plume length.

Modeling Run 2: BTEX at 75 ft depth.

BTEX attenuation modeling results are presented for time-spans of 6 years, 20 years, and 50 years, with an assumed half-life for BTEX of 2 years. The model predicts gradually declining source concentrations with no additional plume expansion.

Modeling Run 3: MTBE at 150 ft depth

MTBE attenuation modeling results for the 150 ft depth are presented for time-spans of 6 years, 20 years, 30 years, and 50 years, with an assumed solute half-life for MTBE or 5 or 10 years.

Representative data from MW-21, MW-22, and MW-23 was used to calibrate the model. Current data corresponds most closely with 20 and 30-year model predictions. The no-degradation model predicts higher-than-actual values for MW-22. The 50 year model can be considered a predictor of conditions 20 to 30 years in the future. The model shows no significant plume expansion.

Modeling Run 4: BTEX at 150 ft depth.

BTEX attenuation modeling results for 150 ft are presented for time-spans of 6 years, 20 years, and 50 years, with an assumed half-life for BTEX of 2 years. The model predicts gradually declining plume concentrations and a gradually declining plume.

Summary of MNA Option

Based on evaluation of available site data, and using variations of model inputs, for the BIOSCREEN program, it appears that MNA is a viable remedial approach for this site:

- the release has been characterized;
- the primary source of the contamination has been removed;
- there are no potential remaining receptors;
- evidence from site data and from modeling indicates the plume is stable or declining;
- sufficient monitoring wells exist that a long-term monitoring plan can be implemented;
- there is no risk to human health and safety or to the environment;
- the local City and County agencies have no plans to develop the groundwater resources in the site area; and
- a contingency plan can be implemented should MNA fail to perform as extrapolated. This plan could include working with City and County agencies for future planned developments to ensure safety and health are protected; working with any proposed water resource user to ensure that wells are situated outside the impacted area; and reevaluating remedial options should suitable technologies become available.

The costs of MNA would be limited to long term monitoring costs, approximately \$30,000 per yr. The duration required before the site is completely remediated is difficult to estimate.

Modeling predictions for time required to biodegrade all source material are not considered reliable, as the source mass quantities for each deep zone were based on estimates. Over a five

year period, continued monitoring would provide additional data on contaminant trends in the deeper zones. This data can then be used to formulate an estimate for the time required to meet remedial goals, and to further refine the Bioscreen modeling analysis.

4.5 Selection of Preferred Remedial Option for Deep Zone Groundwater

The remedial options reviewed for the deep zone at this site are shown below, with weight factors assigned for positive and negative attributes. Weight factors range from lowest or most desirable (1), to highest or least desirable (5).

Remedial Method	Effectiveness on Existing Plume	Risk of Exacerbating Plume	Estimated Duration	Install Costs	Operating Costs	Waste Generation	Permits	Total Score
Groundwater Extraction	2	5	4	4	4	3	2	24
In-situ Chemical Oxidation	2	4	3	5	4	2	4	24
Enhanced Bioremediation	3	3	4	4	2	1	3	20
Monitored Natural Attenuation	3	1	5	1	1	1	1	13

Option 4, MNA, has been selected as the preferred remedial option for the vertical zone. This option has the lowest costs balanced with the highest effectiveness. Options 2 and 3 (in-situ chemical oxidation, and oxygen-enhanced bioremediation) are relatively new techniques of unknown reliability, and have not been proven feasible for the implementation at depths of 75 ft to 185 ft below grade. Option 1, GWE, has an extremely high implementation cost, and has a significant risk of worsening the impacts in the deeper zones. It cannot be guaranteed that GWE would not draw further contaminants into the deeper zones. Contaminants were originally drawn into the deeper zones via pumping. Installation of a cluster of extraction wells at different depths may reduce this possibility. However, it is not possible to guarantee that contaminant concentrations in the deeper zones would not increase if this method were used. Remedial options other than MNA are economically unfeasible, unreasonable, and of questionable

technological feasibility.

As outlined above, this site meets the criteria for suitability for MNA in the deeper zone:

- the release at the site has been characterized;
- the source of the contamination has been removed;
- there are no remaining receptors or potential receptors;
- monitoring data and modeling projections indicate that the plume is stable or declining;
- there is no risk to human health, safety or the environment;
- sufficient monitoring wells exist that a long-term monitoring plan can be implemented; and
- a contingency plan can be implemented should MNA fail to perform as anticipated.

5.0 Monitoring and Reporting Of Remediation Effectiveness

It is recommended that the current monitoring program remain in place to monitor the effectiveness of MNA in the deeper zones, and to monitor the effectiveness of continued groundwater extraction in the shallow zone.

The precise time required to attain remedial goals cannot be accurately assessed. For planning purposes, an estimate of five to ten years should be used for the shallow zone. The time required to attain remedial goals in the deeper zone is dependent upon the quantity of contaminants which were drawn down by DW-2 before it was removed. Over the next five-year period, continued monitoring should provide additional data on contaminant trends in the deeper zones. This data can then be used to verify the effectiveness of MNA, recalibrate the Bioscreen model, and formulate an estimate on time required to meet remedial goals.

It is recommended that site monitoring continue for at least five years. After five years, the monitoring program and the effectiveness of the remedial options should be reassessed.

APPENDIX A

FIGURES

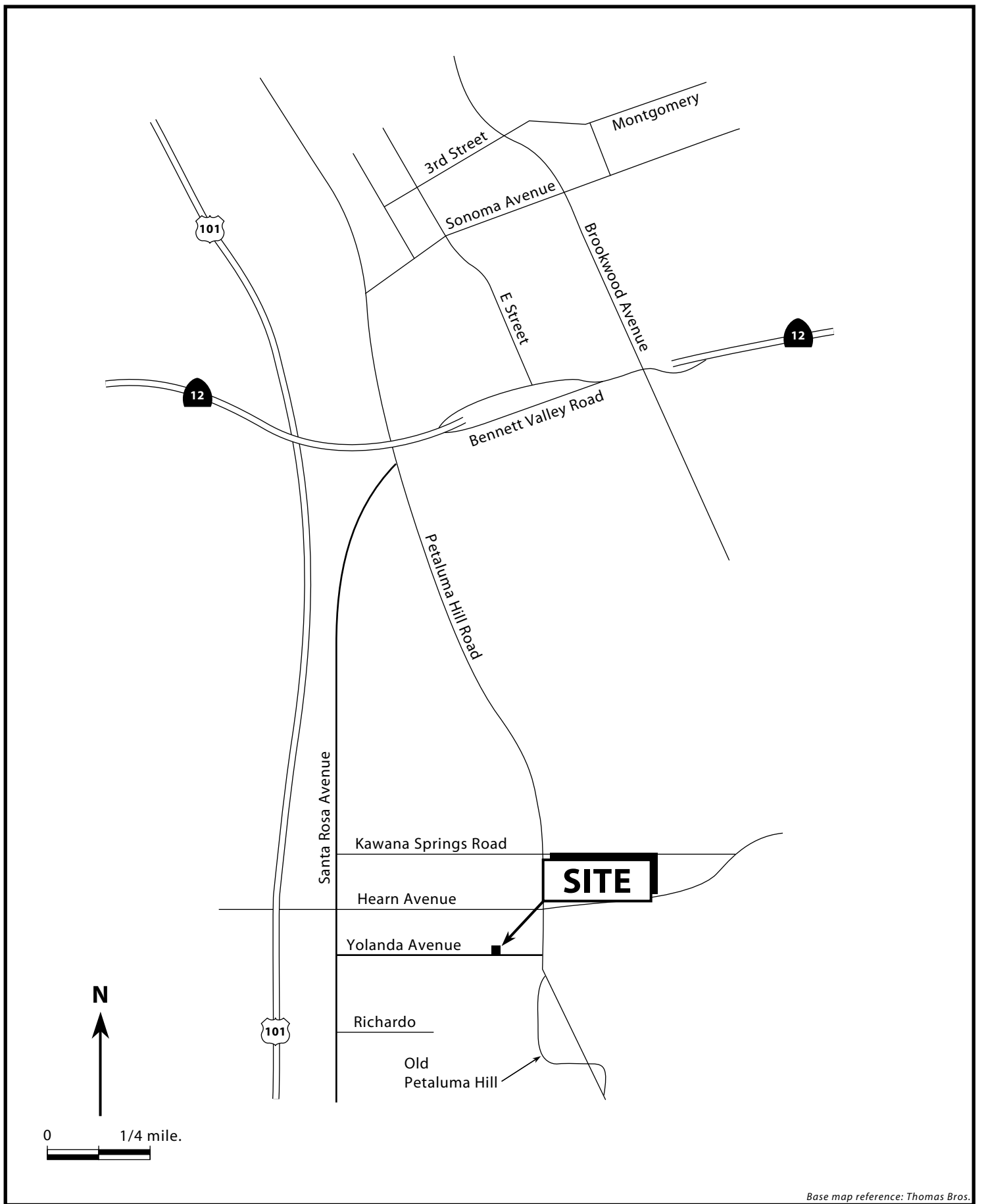


Figure 1. Site Location Map - Redwood Oil Bulk Plant, 455 Yolanda Avenue, Santa Rosa, California



Figure 2- Former H.R. Gantner Bulk Plant, circa 1978

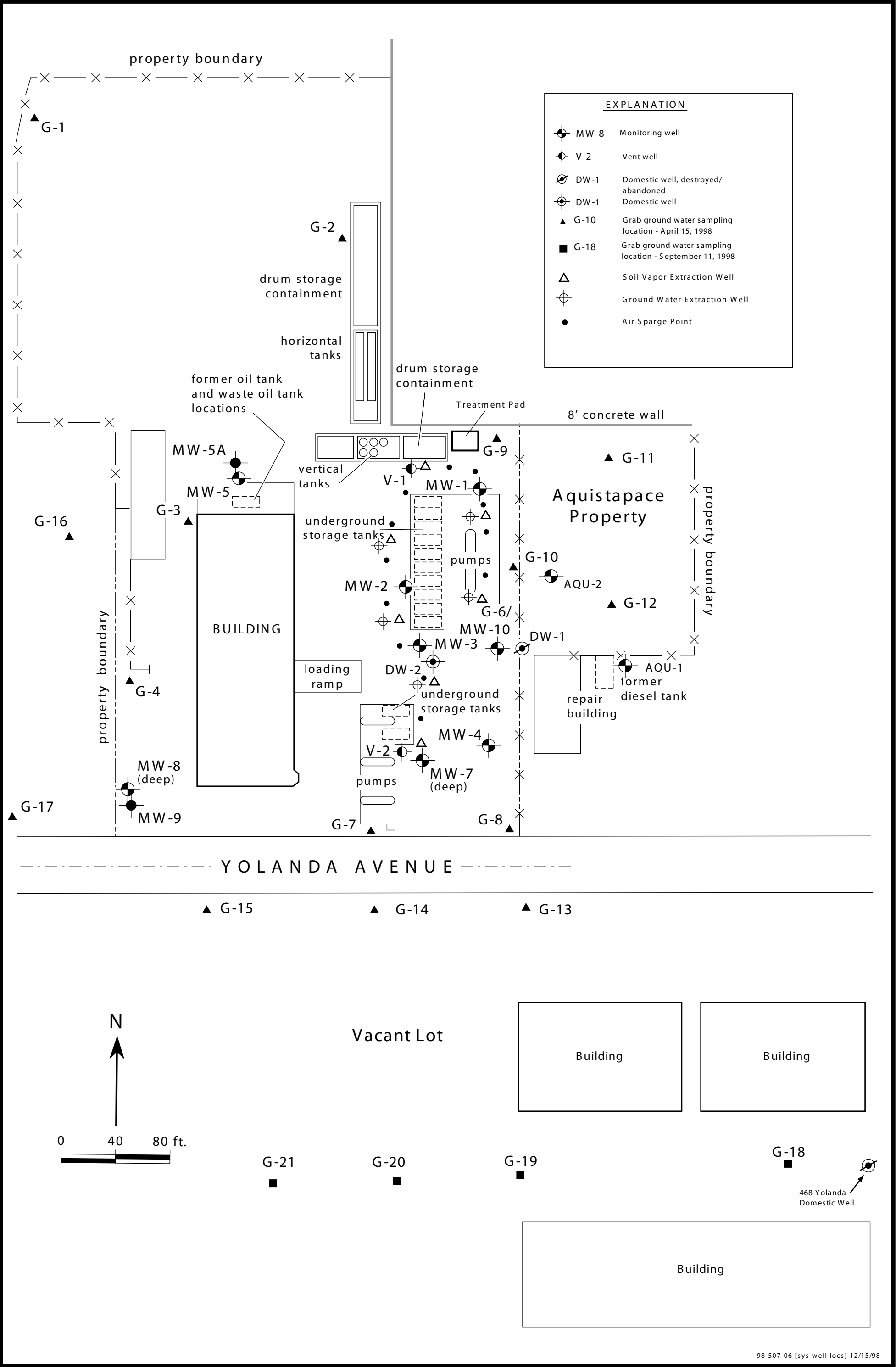


Figure 3. Soil Vapor Extraction wells, Ground Water Extraction Wells, and Air Sparge Points – Redwood Oil Bulk Plant, 455 Yolanda Avenue, Santa Rosa, California

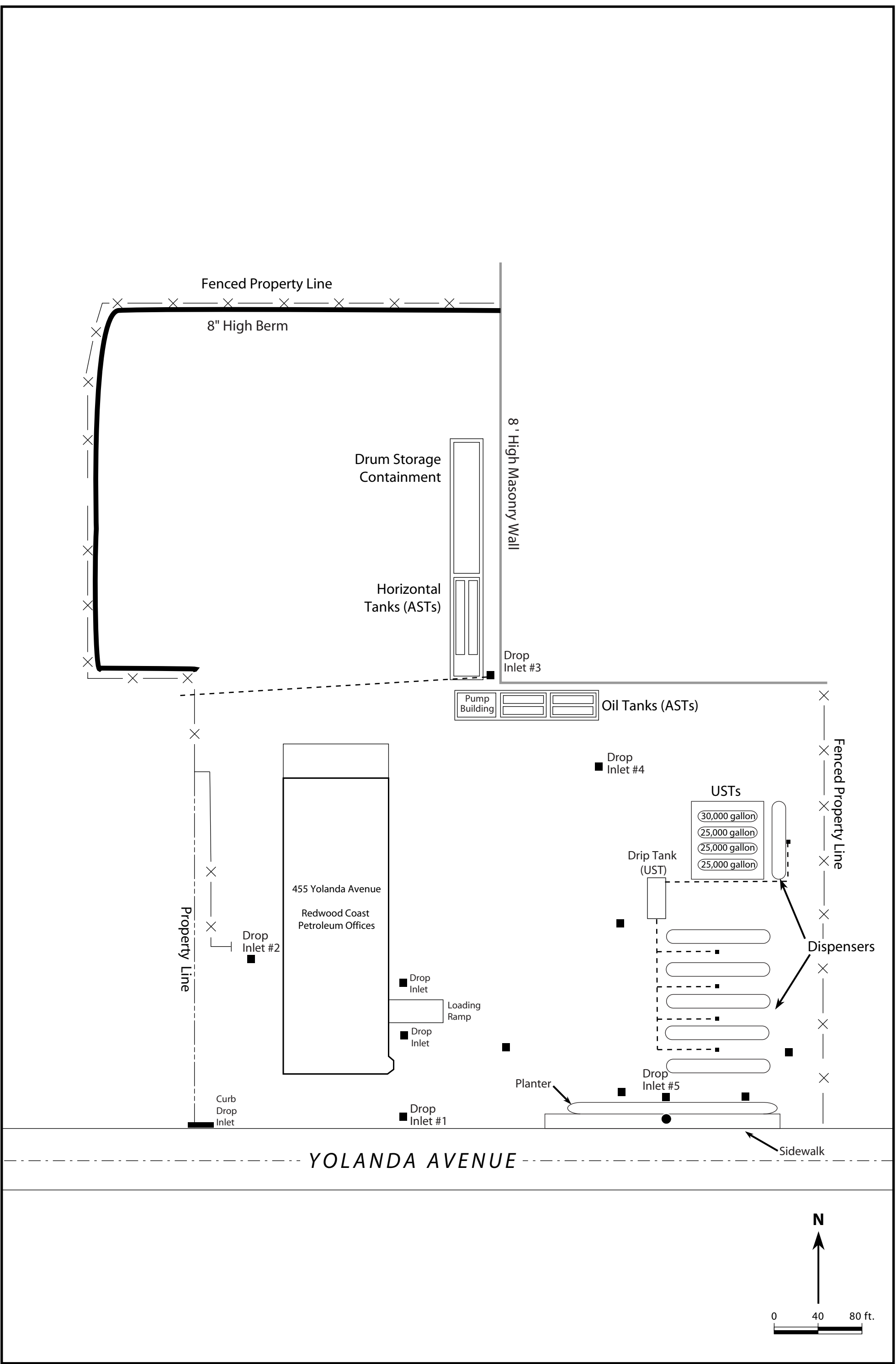


Figure 4. Current Site Plan Base Map (Jan 2006) - Redwood Coast Petroleum, 455 and 459 Yolanda Avenue, Santa Rosa, California

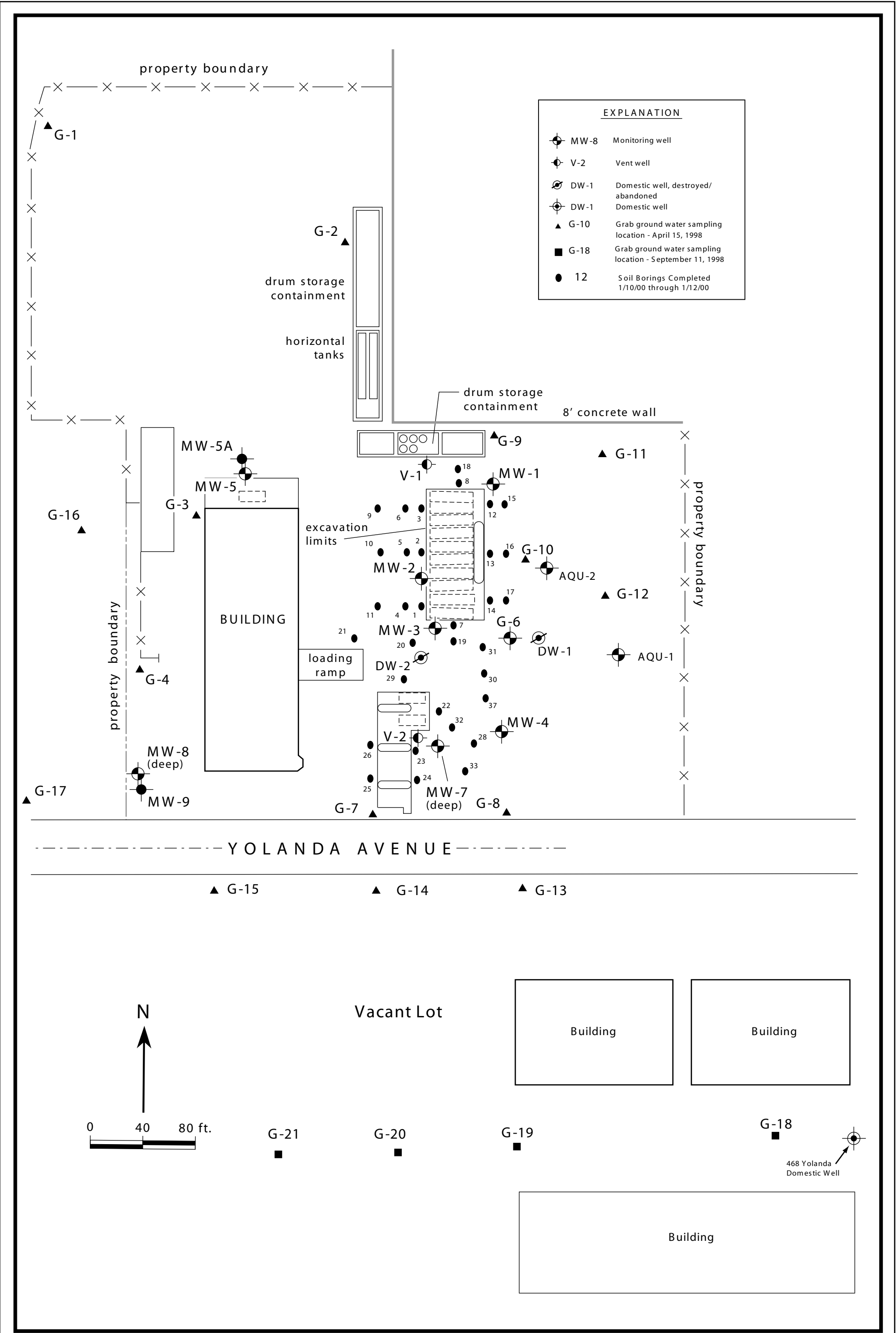


Figure 6. Soil Boring Locations - January 10-12, 2000 - Redwood Oil Bulk Plant, 455 Yolanda Avenue, Santa Rosa, California

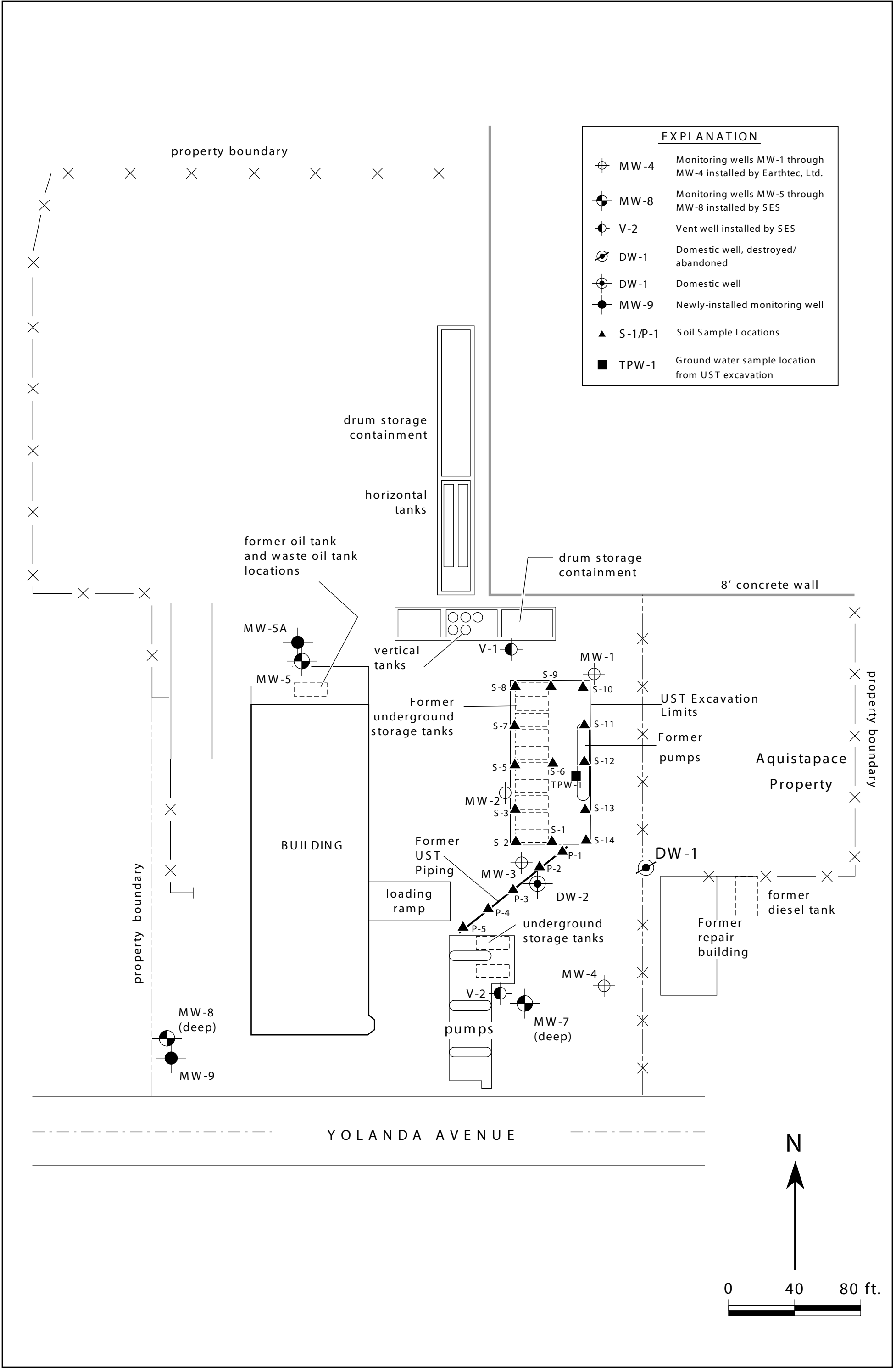


Figure 7. UST Excavation with Soil and Ground Water Sample Locations – Redwood Oil Bulk Plant, 455 Yolanda Avenue, Santa Rosa, California

98-507-33 [UST Excavation] 1/24/00

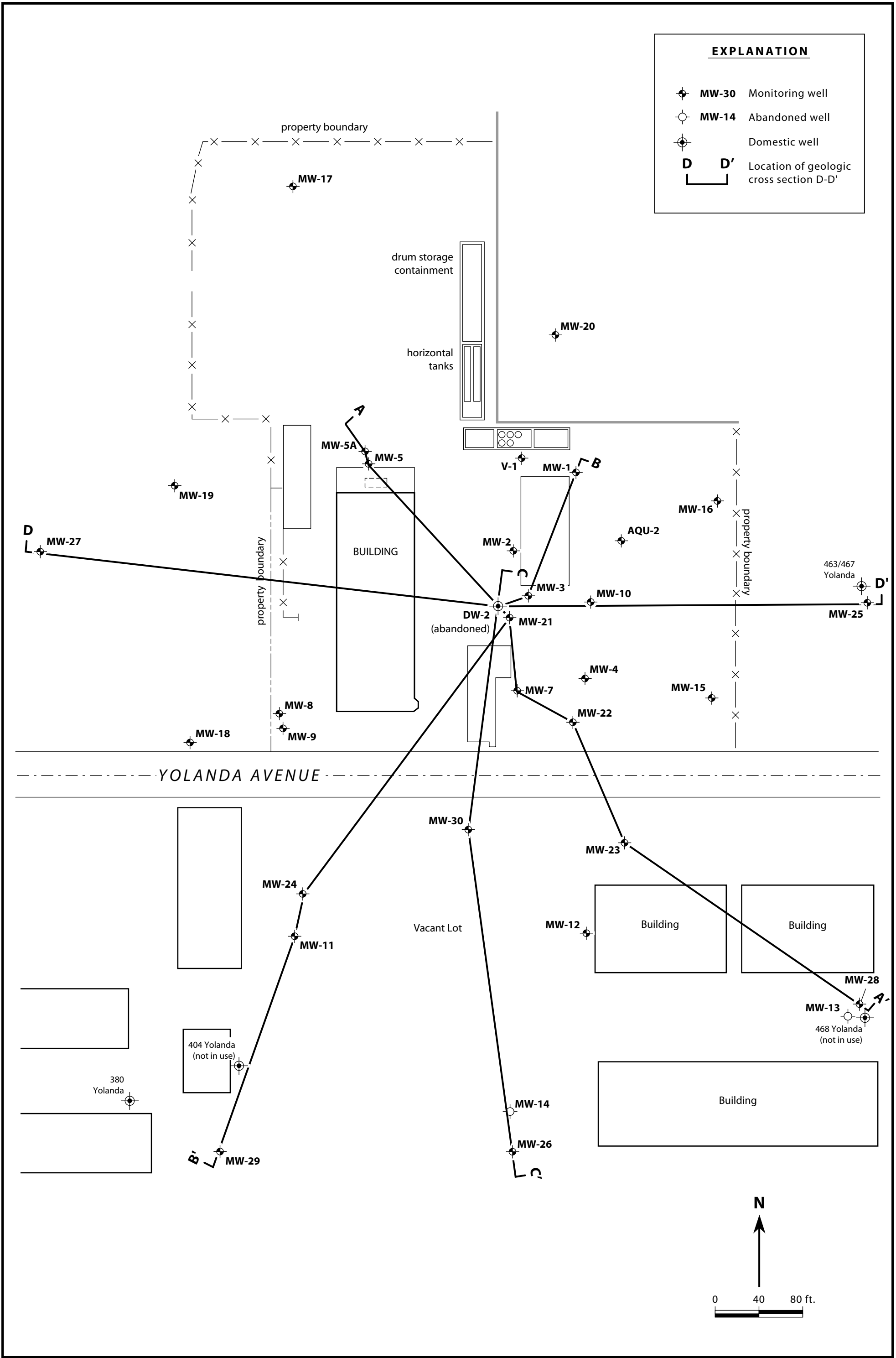


Figure 9. Cross-Section Locations – Redwood Oil Bulk Plant, 455 Yolanda Avenue, Santa Rosa, California

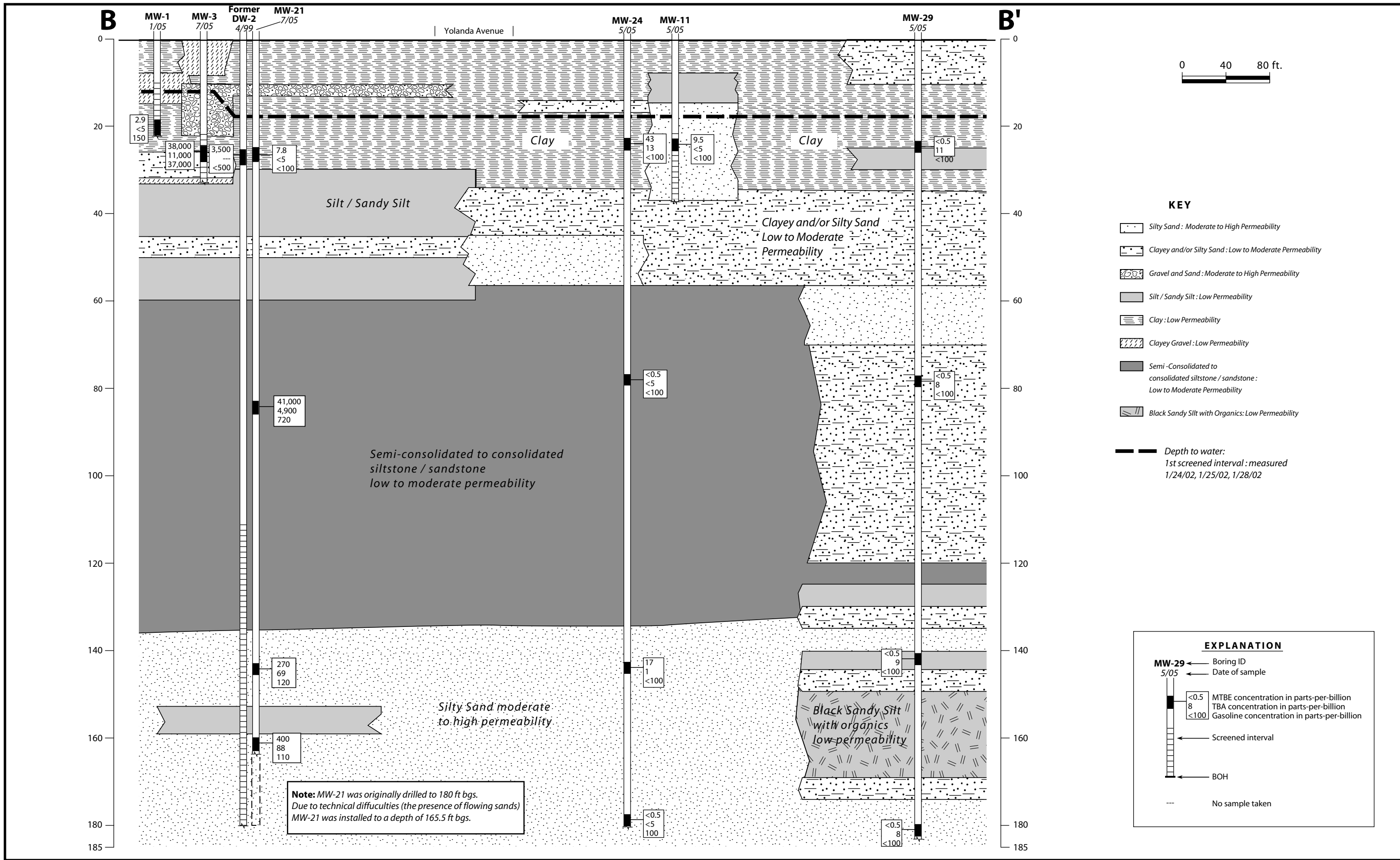


Figure 11. Cross-Section B-B' - 455 Yolanda Avenue, Santa Rosa, California

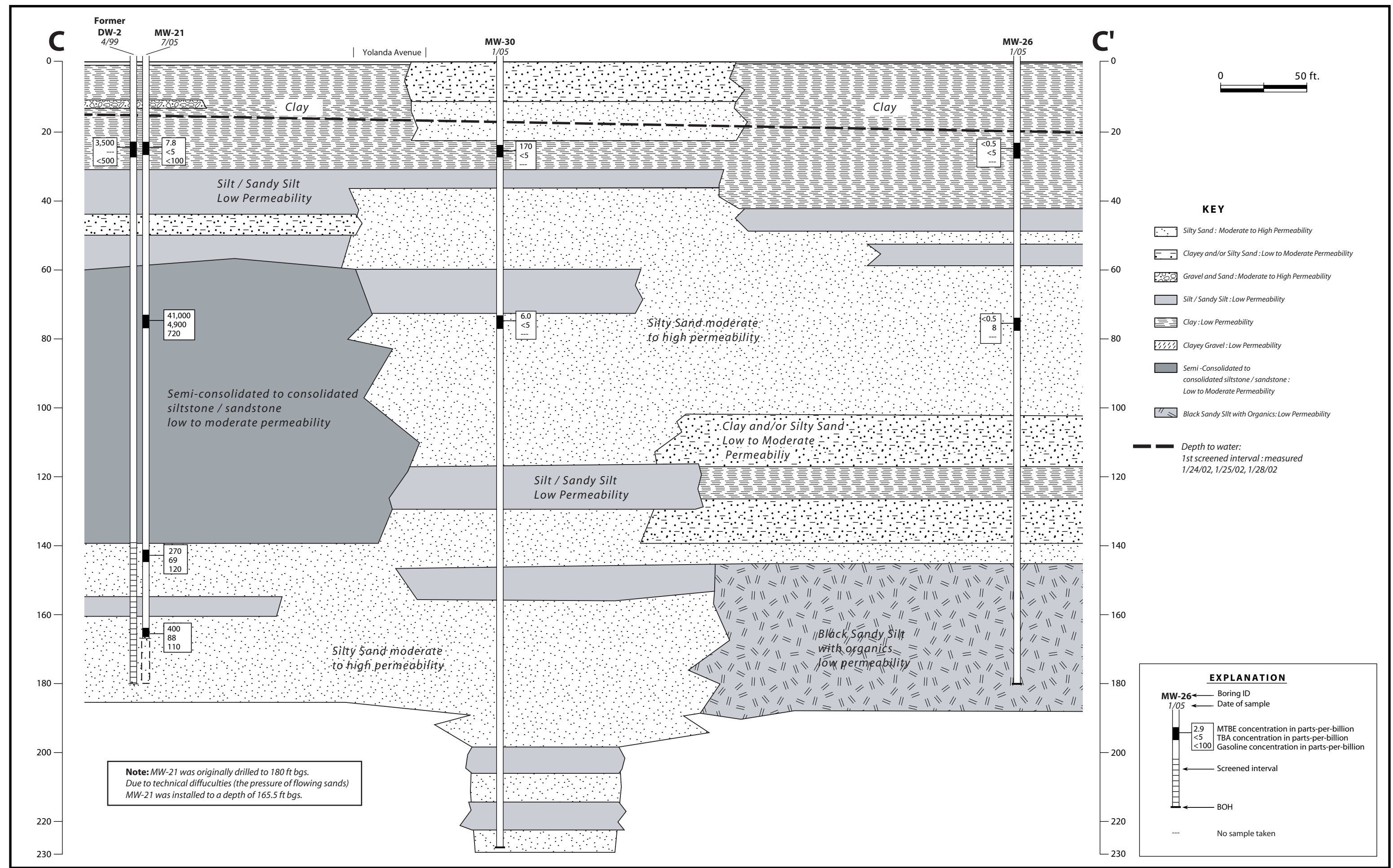


Figure 12. Cross-Section C-C' - 455 Yolanda Avenue, Santa Rosa, California

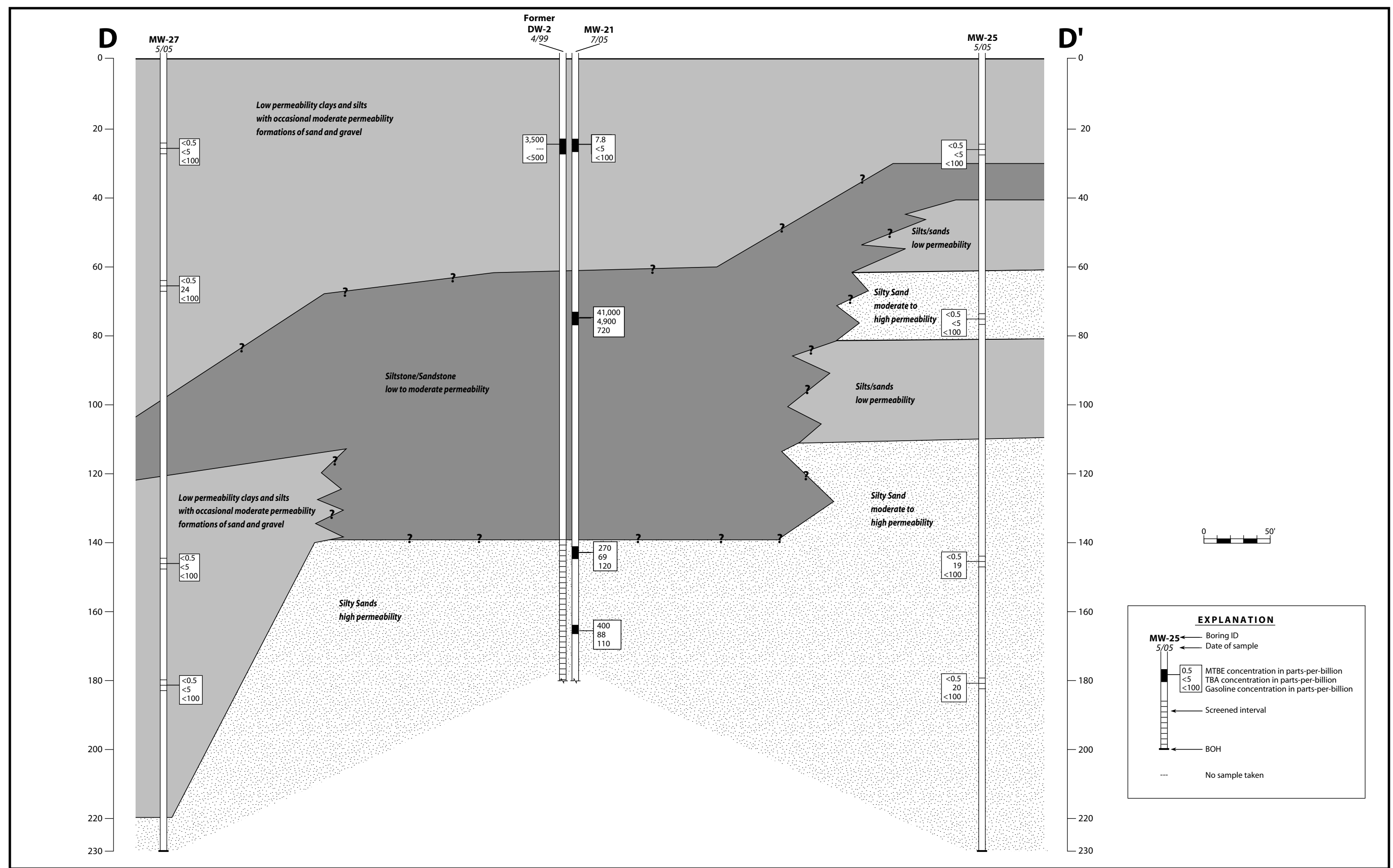


Figure 13. Cross-Section D-D' - 455 Yolanda Avenue, Santa Rosa, California

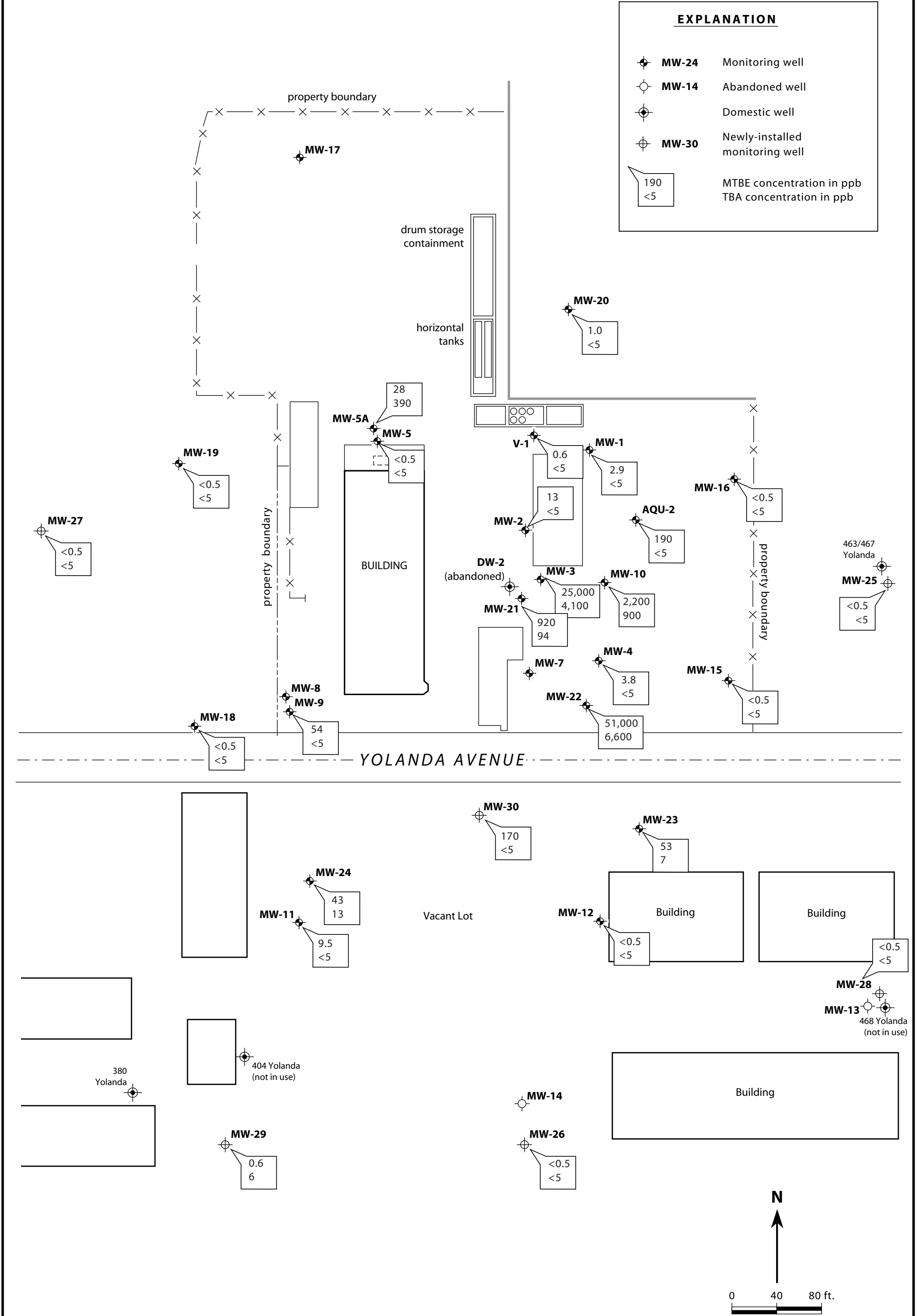


Figure 14. □ MTBE and TBA Concentrations at ~25 Feet Below Ground Surface - January 2005 and May 2005 Sampling Events
– Redwood Oil Bulk Plant, 455 Yolanda Avenue, Santa Rosa, California

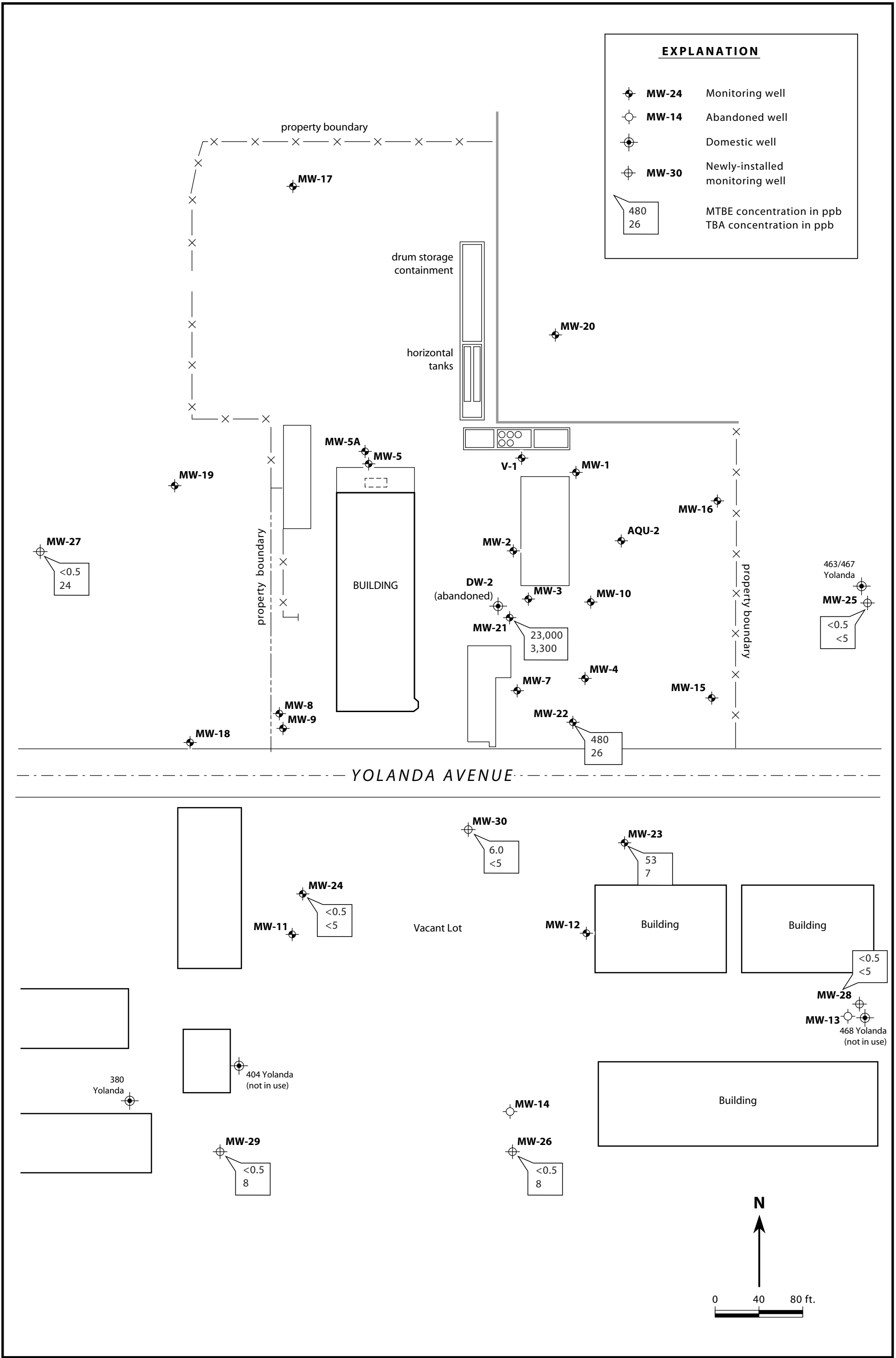


Figure 15. □ MTBE and TBA Concentrations at ~75 Feet Below Ground Surface - January 2005 and May 2005 Sampling Events
– Redwood Oil Bulk Plant, 455 Yolanda Avenue, Santa Rosa, California

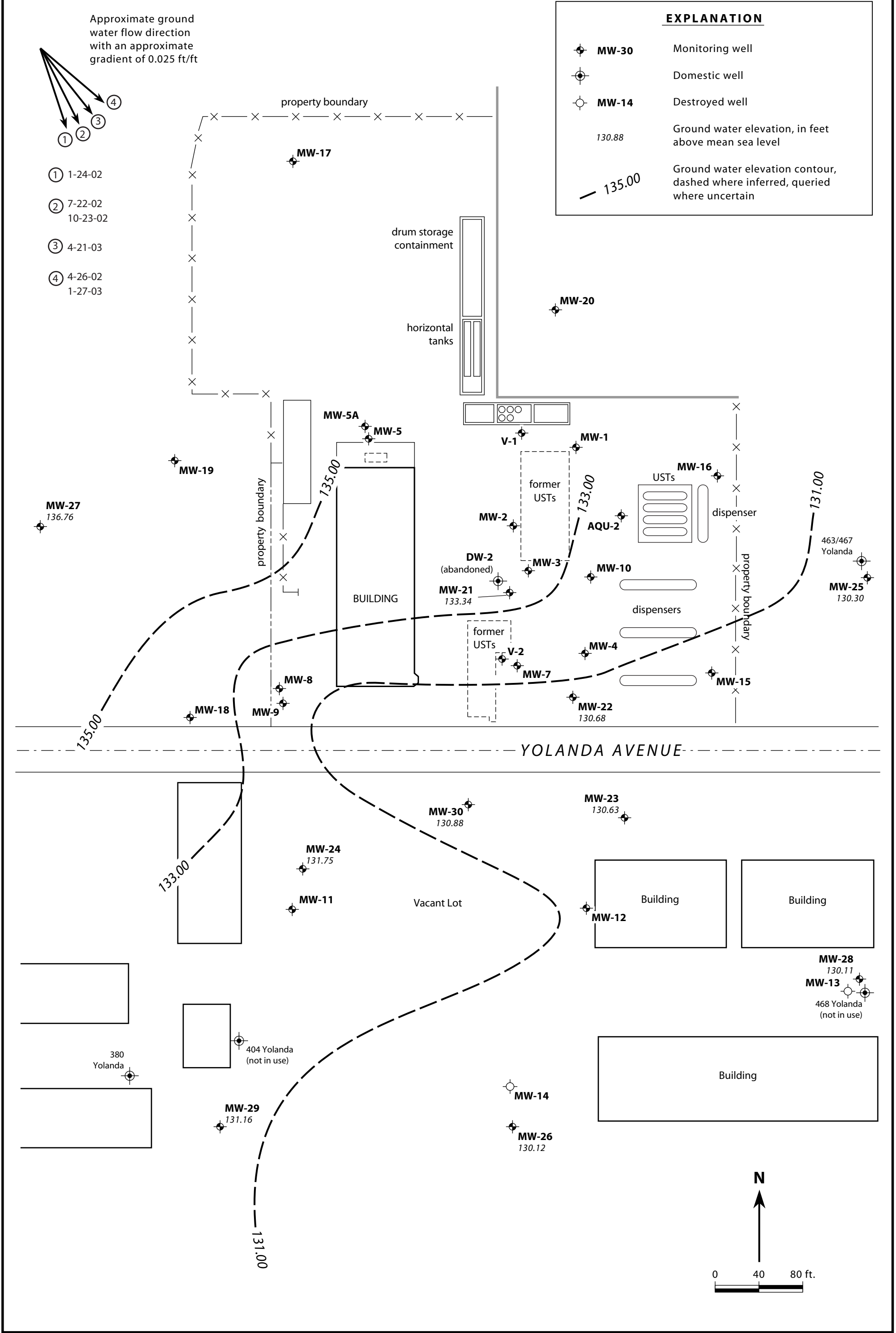


Figure 17. Monitoring Well Locations and Ground Water Elevation Contour Map for Multilevel Wells at 75 feet - January 27, 2003 - Redwood Oil Bulk Plant, 455 Yolanda Avenue, Santa Rosa, California

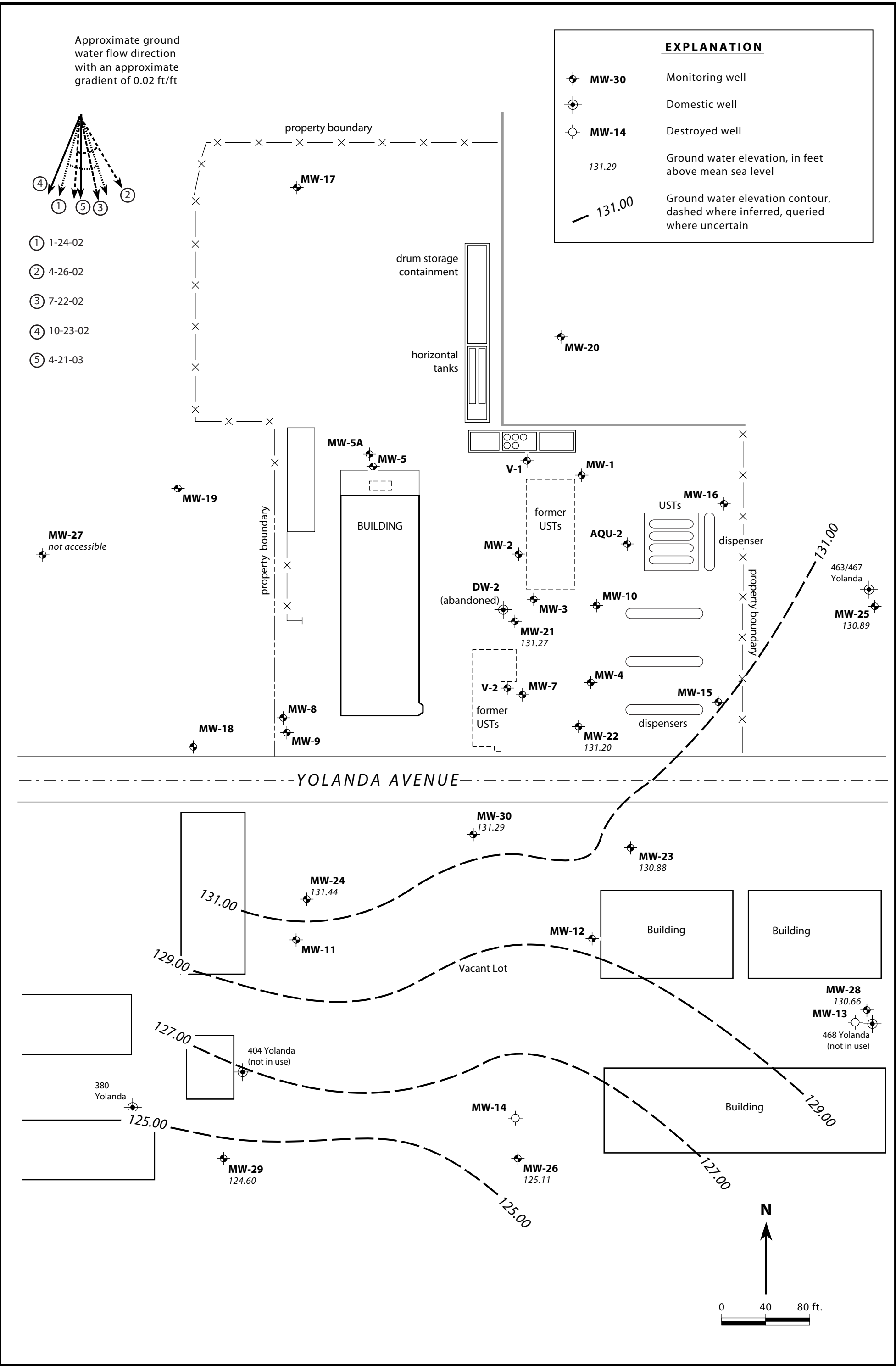


Figure 18. Monitoring Well Locations and Ground Water Elevation Contour Map for Multilevel Wells at 145 feet - April 21, 2003 - Redwood Oil Bulk Plant, 455 Yolanda Avenue, Santa Rosa, California

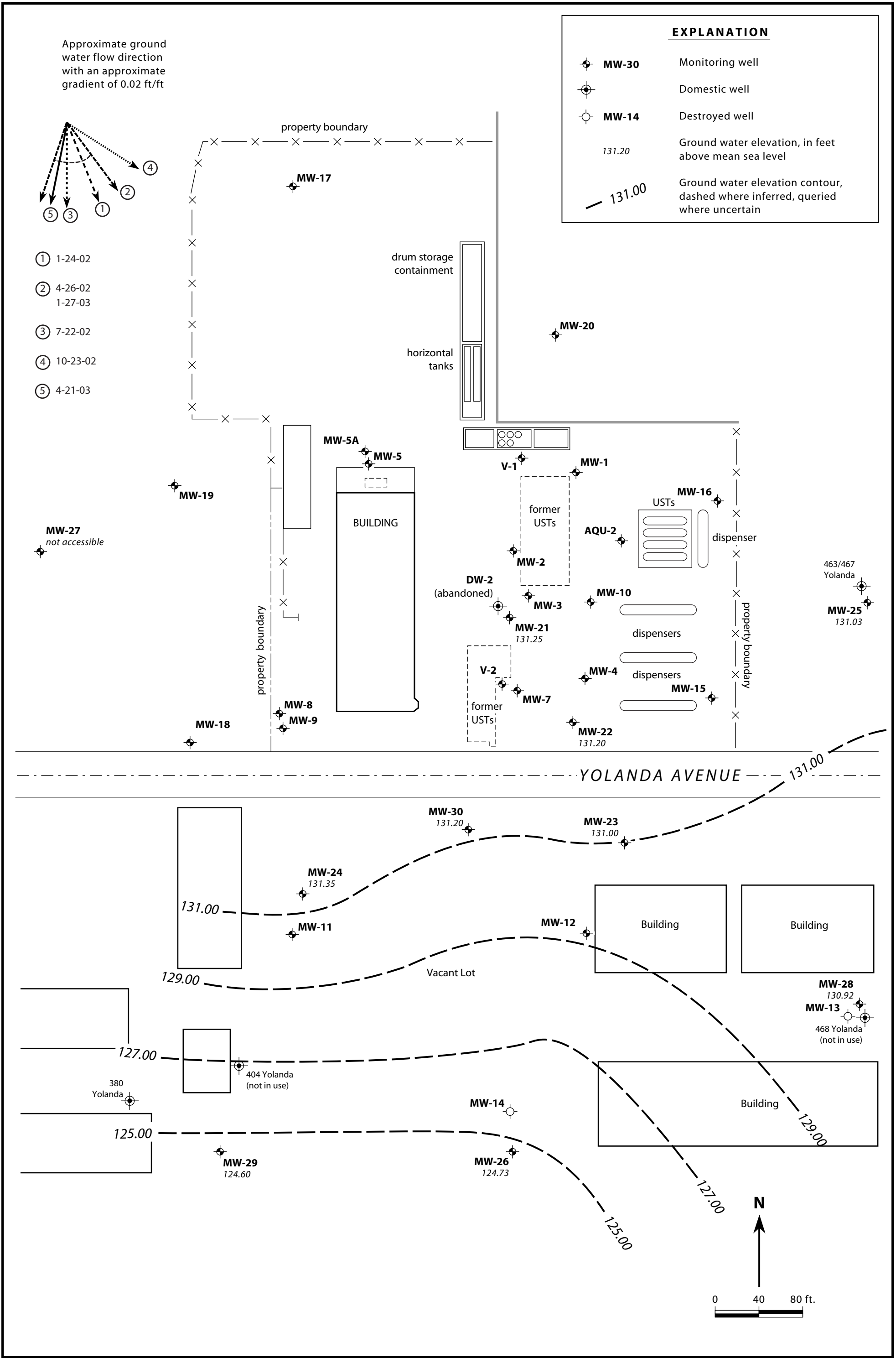


Figure 19. Monitoring Well Locations and Ground Water Elevation Contour Map for Multilevel Wells at 180 feet - April 21, 2003 - Redwood Oil Bulk Plant, 455 Yolanda Avenue, Santa Rosa, California

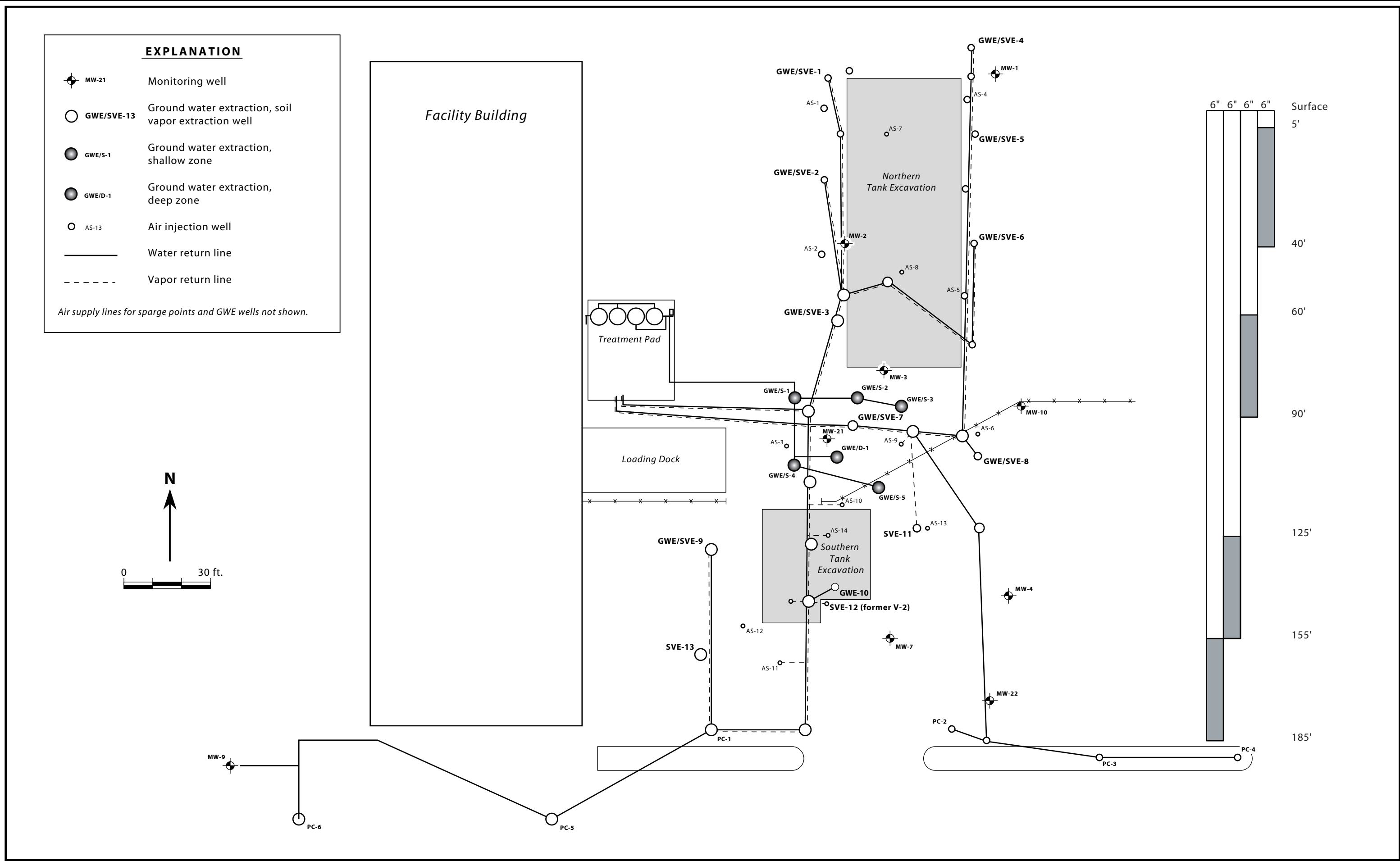


Figure 20. Deep Zone GWE Schematic, Remediation System - Plan View - 455 Yolanda Avenue, Santa Rosa, California

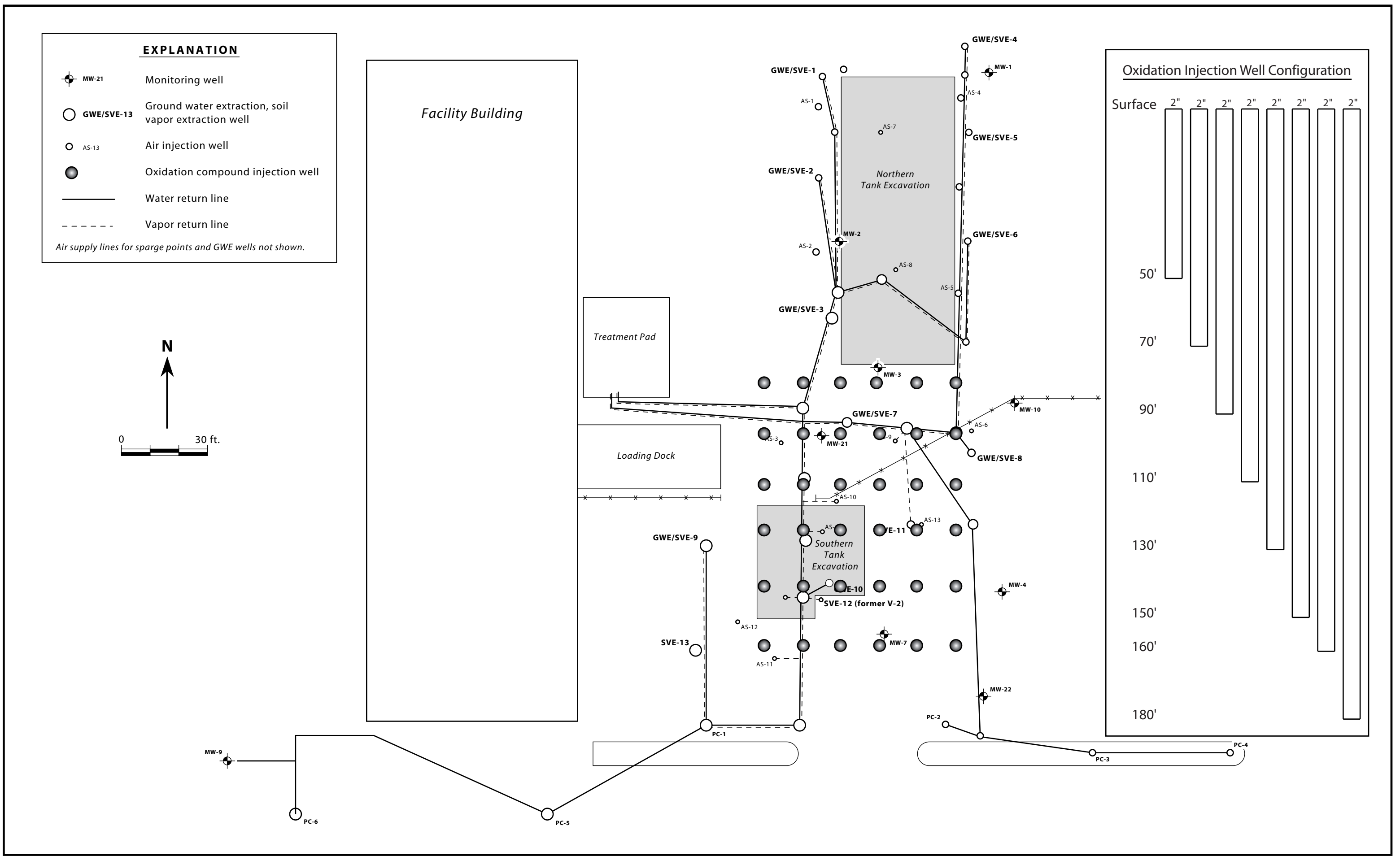


Figure 21. Oxidation Compound Injection System Schematic - Plan View - 455 Yolanda Avenue, Santa Rosa, California

APPENDIX B
TABLES

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-1	01/11/91	---	102.77	---	---	9 - 24	7 - 24	0 - 7	
	02/08/91	---		---	---				
	03/08/91	---		---	---				
	06/13/91	22.02		80.75	0.00				
	07/09/91	22.22		80.55	0.00				
	08/01/91	22.00		80.77	0.00				
	08/29/91	21.73		81.04	0.00				
	09/11/91	21.75		81.02	0.00				
	10/08/91	22.04		80.73	0.00				
	11/08/91	22.23		80.54	0.00				
	12/11/91	---		---	0.00				
	01/13/92	21.41		81.36	0.00				
	02/11/92	20.25		82.52	0.00				
	03/11/92	12.79		89.98	0.00				
	04/13/92	13.76		89.01	0.00				
	05/15/92	15.49		87.28	0.00				
	06/15/92	16.85		85.92	0.00				
	07/16/92	17.74		85.03	0.00				
	08/18/92	17.56		85.21	0.00				
	09/18/92	18.62		84.15	0.00				
	12/08/92	18.38		84.39	0.00				
	03/10/93	13.29		89.48	0.00				
	06/04/93	12.77		90.00	0.00				
	10/14/93	23.66		79.11	0.00				
	04/11/94	14.58		88.19	0.00				
	10/19/94	14.51		88.26	0.00				
	04/11/95	9.18		93.59	0.00				
	03/06/96	10.16		92.61	0.00				
	10/14/96	12.36	102.78	90.42	0.00				Top of casing elevations re-surveyed.
	04/09/97	10.75		92.03	0.00				
	10/29/97	13.28		89.50	0.00				
	04/07/98	8.06		94.72	0.00				
	10/07/98	11.51		91.27	0.00				
	04/07/99	8.71		94.07	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-1	10/19/99	11.98	102.78	90.80	0.00	9 - 24	7 - 24	0 - 7	
	04/26/00	---		---	0.00				Well inaccessible due to construction activities.
	10/30/00	11.41	146.16	134.75	0.00				Top of casing elevations re-surveyed.
	02/01/01	11.28		134.88	0.00				
	04/23/01	14.29		131.87	0.00				
	07/23/01	14.88		131.28	0.00				
	10/23/01	16.46		129.70	0.00				
	01/21/02	12.77	148.81	136.04	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	12.80		136.01	0.00				
	07/22/02	13.20		135.61	0.00				
	10/22/02	13.76		135.05	0.00				
	01/27/03	13.00		135.81	0.00				
	04/21/03	12.85		135.96	0.00				
	07/21/03	13.36		135.45	0.00				
	01/20/04	10.04		138.77	0.00				
	07/19/04	13.04		135.77	0.00				
	01/18/05	9.96		138.85	0.00				
	07/12/05	9.40		139.41	0.00				
MW-2	01/11/91	21.36	102.18	80.82	0.00	10 - 25	7.5 - 25	0 - 7.5	
	02/08/91	18.24		83.94	0.00				
	03/08/91	16.52		85.66	0.00				
	06/13/91	20.95		81.23	0.00				
	07/09/91	20.98		81.20	0.00				
	08/01/91	20.98		81.20	0.00				
	08/29/91	21.28		80.90	0.00				
	09/11/91	21.36		80.82	0.00				
	10/08/91	21.83		80.25	0.22				
	11/08/91	20.56		81.62	0.00				
	12/11/91	21.08		81.10	0.00				
	01/13/92	18.56		83.62	0.00				
	02/11/92	14.30		87.88	0.00				
	03/11/92	11.81		90.37	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-2	04/13/92	13.23	102.18	88.95	0.00	10 - 25	7.5 - 25	0 - 7.5	
	05/15/92	15.09		87.09	0.00				
	06/15/92	16.95		85.23	0.00				
	07/16/92	17.96		84.22	0.00				
	08/18/92	17.76		84.42	0.00				
	09/18/92	18.75		83.43	0.00				
	12/08/92	14.66		87.52	0.00				
	03/10/93	12.80		89.38	0.00				
	06/04/93	13.25		88.93	0.00				
	10/14/93	16.20		85.98	0.00				
	04/11/94	14.85		87.33	0.00				
	10/19/94	15.04		87.14	0.00				
	04/11/95	9.77		92.41	0.00				
	03/06/96	10.12		92.06	0.00				
	10/14/96	12.45		89.74	0.00				
	04/10/97	10.79		91.40	0.00				
	10/28/97	13.32		88.87	0.00				
	04/07/98	8.02		94.17	0.00				
	10/07/98	11.64		90.55	0.00				
	04/07/99	8.79		93.40	0.00				
	10/19/99	12.05		90.14	0.00				
	04/26/00	---		---	---				Well inaccessible due to construction activities.
	10/30/00	10.80	145.32	134.52	0.00				Top of casing elevations re-surveyed.
	02/01/01	10.70		134.62	0.00				
	04/23/01	13.74		131.58	0.00				
	07/23/01	14.22		131.10	0.00				
	10/23/01	16.04		129.28	0.00				
	01/21/02	13.36		134.61	0.00				
	04/25/02	13.80		134.17	0.00				
	07/22/02	13.81		134.16	0.00				
	10/22/02	13.82		134.15	0.00				
	01/27/03	13.18	147.97	134.79	0.00				Top of casing elevations were surveyed for EDF compliance.

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/Grout Interval	Notes
MW-2	04/21/03	12.34	147.97	135.63	0.00	10 - 25	7.5 - 25	0 - 7.5	
	07/21/03	13.01		134.96	0.00				
	01/20/04	11.81		136.16	0.00				
	07/19/04	12.84		135.13	0.00				
	01/18/05	11.14		136.83	0.00				
	07/12/05	11.02		136.95	0.00				
MW-3	01/11/91	---	101.94	---	---	18 - 33	17 - 33	0 - 17	
	02/08/91	---		---	---				
	03/08/91	28.28		73.66	0.00				
	06/13/91	---		---	---				
	07/09/91	---		---	---				
	08/01/91	---		---	---				
	08/29/91	---		---	---				
	09/11/91	---		---	---				
	10/08/91	---		---	---				
	11/08/91	---		---	---				
	12/11/91	---		---	---				
	01/13/92	---		---	---				
	02/11/92	18.82		83.12	0.00				
	03/11/92	11.76		90.18	0.00				
	04/13/92	12.25		89.69	0.00				
	05/15/92	15.35		86.59	0.00				
	06/15/92	17.61		84.33	0.00				
	07/16/92	19.86		82.08	0.00				
	08/18/92	19.66		82.28	0.00				
	10/18/92	26.00		75.94	0.00				
	12/08/92	17.24		84.70	0.00				
	03/10/93	14.60		87.34	0.00				
	06/04/93	13.95		87.99	0.00				
	10/14/93	---		---	---				
	04/11/94	16.58		85.36	0.00				
	10/19/94	16.01		85.93	0.00				
	04/11/95	11.12		90.82	0.00				
	03/06/96	11.72		90.22	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-3	10/14/96	13.94	101.97	88.03	0.00	18 - 33	17 - 33	0 - 17	
	04/10/97	12.08		89.90	0.01				
	10/29/97	16.02		85.99	0.02				
	04/07/98	9.97		92.00	0.00				
	10/07/98	12.66		89.31	0.00				
	04/07/99	9.70		92.27	0.00				
	10/19/99	13.15		88.82	0.00				
	04/26/00	---		---	---				Well inaccessible due to construction activities.
	10/30/00	---	145.10	---	---				Well plugged at seven feet, no water.
	02/01/01	12.33		132.77	0.00				
	04/23/01	---		---	---				Well was inaccessible
	07/23/01	14.98		130.12	0.00				
	10/23/01	17.00		128.10	0.00				
	01/21/02	13.67	147.75	134.08	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	14.50		133.25	0.00				
	07/22/02	14.96		132.79	0.00				
	10/22/02	15.22		132.53	0.00				
	01/27/03	14.21		133.54	0.00				
	04/21/03	13.47		134.28	0.00				
	07/21/03	14.43		133.32	0.00				
	01/20/04	12.00		135.75	0.00				
	07/19/04	14.03		133.72	0.00				
	01/18/05	11.11		136.64	0.00				
	07/12/05	11.68		136.07	0.00				
MW-4	01/11/91	---	101.47	---	---	10 - 25	7 - 25	0 - 7	
	02/08/91	---		---	---				
	03/08/91	---		---	---				
	06/13/91	---		---	---				
	07/09/91	---		---	---				
	08/01/91	---		---	---				
	08/29/91	---		---	---				
	09/11/91	---		---	---				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/Grout Interval	Notes
MW-4	10/08/91	---	101.47	---	---	10 - 25	7 - 25	0 - 7	
	11/08/91	---		---	---				
	12/11/91	---		---	---				
	01/13/92	24.47		77.00	0.00				
	02/11/92	26.06		75.41	0.00				
	03/11/92	23.46		78.01	0.00				
	04/13/92	24.25		77.22	0.00				
	05/15/92	---		---	---				
	06/15/92	---		---	---				
	07/16/92	---		---	---				
	08/18/92	---		---	---				
	09/18/92	---		---	---				
	12/08/92	---		---	---				
	03/10/93	---		---	---				
	06/04/93	---		---	---				
	10/14/93	---		---	---				
	04/11/94	---		---	---				
	10/19/94	---		---	---				
	04/11/95	---		---	---				
	03/06/96	16.52		84.95	0.00				
	10/14/96	20.39	101.70	81.31	0.00				
	04/10/97	16.02		85.68	0.00				
	10/29/97	21.61		80.09	0.00				
	04/07/98	11.30		90.40	0.00				
	10/07/98	15.53		86.17	0.00				
	04/07/99	11.95		89.75	0.00				
	10/19/99	15.15		86.55	0.00				
	04/26/00	10.38		91.32	0.00				
	06/01/00	---		---	---				
	10/30/00	13.78	145.47	131.69	0.00				Top of casing elevations were surveyed.
	02/01/01	13.41		132.06	0.00				
	04/23/01	19.27		126.20	0.00				
	07/23/01	17.65		127.82	0.00				
	10/23/01	19.88		125.59	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-4	01/21/02	13.62	148.12	134.50	0.00	10 - 25	7 - 25	0 - 7	Top of casing elevations were surveyed for EDF compliance.
	04/25/02	14.47		133.65	0.00				
	07/22/02	15.57		132.55	0.00				
	10/22/02	17.23		130.89	0.00				
	01/27/03	13.00		135.12	0.00				
	04/21/03	13.42		134.70	0.00				
	07/21/03	14.15		133.97	0.00				
	01/20/04	11.67		136.45	0.00				
	07/19/04	14.47		133.65	0.00				
	01/18/05	11.31		136.81	0.00				
	07/12/05	11.53		136.59	0.00				
MW-5	06/13/91	25.84	101.37	75.53	0.00	34.5 - 44.5	32.5 - 44.5	0 - 32.5	
	07/09/91	25.98		75.39	0.00				
	08/01/91	23.22		78.15	0.00				
	08/29/91	22.79		78.58	0.00				
	09/11/91	22.58		78.79	0.00				
	10/08/91	27.46		73.91	0.00				
	11/08/91	24.36		77.01	0.00				
	12/11/91	23.35		78.02	0.00				
	01/13/92	23.96		77.41	0.00				
	02/11/92	23.67		77.70	0.00				
	03/11/92	22.01		79.36	0.00				
	04/13/92	21.50		79.87	0.00				
	05/15/92	18.96		82.41	0.00				
	06/15/92	18.72		82.65	0.00				
	07/16/92	19.88		81.49	0.00				
	08/18/92	19.38		81.99	0.00				
	09/18/92	19.60		81.77	0.00				
	12/08/92	20.04		81.33	0.00				
	03/10/93	16.60		84.77	0.00				
	06/04/93	15.96		85.41	0.00				
	10/14/93	18.68		82.69	0.00				
	04/11/94	14.46		86.91	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/Grout Interval	Notes
MW-5	10/19/94	15.56	101.37	85.81	0.00	34.5 - 44.5	32.5 - 44.5	0 - 32.5	
	04/11/95	9.52		91.85	0.00				
	03/06/96	10.60		90.77	0.00				
	10/14/96	11.81		89.53	0.00				
	04/09/97	10.08		91.26	0.00				
	10/29/97	15.05		86.29	0.00				
	04/07/98	8.01		93.33	0.00				
	10/07/98	9.82		91.52	0.00				
	04/07/99	9.12		92.22	0.00				
	10/19/99	12.96		88.38	0.00				
	04/26/00	9.28		92.06	0.00				
	10/30/00	---	145.73	---	---				Well inaccessible due to area flooding
	02/01/01	11.52		134.21	0.00				
	04/23/01	15.25		130.48	0.00				
	07/23/01	13.22		132.51	0.00				
	10/23/01	13.15		132.58	0.00				
	01/21/02	12.50	148.38	135.88	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	12.02		136.36	0.00				
	07/22/02	11.00		137.38	0.00				
	10/22/02	11.40		136.98	0.00				
	01/27/03	10.78		137.60	0.00				
	04/21/03	9.15		139.23	0.00				
	01/20/04	8.00		140.38	0.00				
	07/19/04	10.53		137.85	0.00				
	01/18/05	10.09		138.29	0.00				
	07/12/05	7.11		141.27	0.00				
MW-5A	10/14/96	11.80	101.37	89.57	0.00	50 - 60	49 - 60	0 - 49	
	04/10/97	10.16		91.21	0.00				
	10/29/97	16.80		84.57	0.00				
	04/07/98	9.64		91.73	0.00				
	10/07/98	10.09		91.28	0.00				
	04/07/99	7.55		93.82	0.00				
	10/19/99	---		---	---				Well casing was damaged.

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-5A	04/26/00	7.58	101.37	93.79	0.00	50 - 60	49 - 60	0 - 49	
	10/30/00	---	145.70	---	---				Well inaccessible due to area flooding
	02/01/01	11.17		134.53	0.00				
	04/23/01	11.75		133.95	0.00				
	07/23/01	12.58		133.12	0.00				
	10/23/01	13.71		131.99	0.00				
	01/21/02	12.55	148.35	135.80	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	11.45		136.90	0.00				
	07/22/02	10.75		137.60	0.00				
	10/22/02	10.90		137.45	0.00				
	01/27/03	10.31		138.04	0.00				
	04/21/03	10.35		138.00	0.00				
	07/19/04	10.03		138.32	0.00				
	01/18/05	10.15		138.20	0.00				
	07/12/05	8.42		139.93	0.00				
MW-7	06/13/91	34.93	100.86	65.93	0.00	51 - 60	49 - 60	0 - 49	
	07/09/91	35.05		65.81	0.00				
	08/01/91	35.76		65.10	0.00				
	08/29/91	37.28		63.58	0.00				
	09/11/91	36.71		64.15	0.00				
	10/08/91	36.59		64.27	0.00				
	11/08/91	36.31		64.55	0.00				
	12/11/91	36.55		63.31	0.00				
	01/13/92	37.03		63.83	0.00				
	02/11/92	36.20		64.66	0.00				
	03/11/92	34.51		66.35	0.00				
	04/13/92	33.85		67.01	0.00				
	05/15/92	33.04		67.82	0.00				
	06/15/92	35.53		65.33	0.00				
	07/16/92	35.42		65.44	0.00				
	08/18/92	35.03		65.83	0.00				
	09/18/92	35.52		65.34	0.00				
	12/08/92	34.36		66.50	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-7	03/10/93	30.21	100.86	70.65	0.00	51 - 60	49 - 60	0 - 49	
	06/04/93	29.33		71.53	0.00				
	10/14/93	32.23		68.63	0.00				
	04/11/94	28.87		71.99	0.00				
	10/19/94	31.19		69.67	0.00				
	04/11/95	22.49		78.37	0.00				
	03/06/96	21.44		79.42	0.00				
	10/14/96	---	101.03	---	---				Top of casing elevations re-surveyed.
	04/09/97	20.67		80.36	0.00				
	10/29/97	24.71		76.32	0.00				
	04/07/98	16.96		84.07	0.00				
	10/07/98	19.46		81.57	0.00				
	04/07/99	15.27		85.76	0.00				
	10/19/99	18.79		82.24	0.00				
	04/26/00	13.45		87.58	0.00				
	10/30/00	17.01	144.72	127.71	0.00				Top of casing elevations re-surveyed.
	02/01/01	16.17		128.55	0.00				
	04/23/01	18.12		126.60	0.00				
	07/23/01	19.53		125.19	0.00				
	10/23/01	22.00		122.72	0.00				
	01/21/02	16.30	147.37	131.07	0.00				Top of casing elevations were resurveyed for EDF compliance.
	04/25/02	16.27		131.10	0.00				
	07/22/02	17.81		129.56	0.00				
	10/22/02	18.90		128.47	0.00				
	01/27/03	15.20		132.17	0.00				
	04/21/03	14.92		132.45	0.00				
	07/21/03	16.27		131.10	0.00				
	01/20/04	14.37		133.00	0.00				
	07/19/04	17.90		129.47	0.00				
	01/18/05	12.07		135.30	0.00				
	07/12/05	13.00		134.37	0.00				
MW-8	06/13/91	32.68	101.53	68.85	0.00	49 - 59	47.5 - 59	0 - 47.5	
	07/09/91	32.81		68.72	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-8	08/01/91	33.26	101.53	68.27	0.00	49 - 59	47.5 - 59	0 - 47.5	
	08/29/91	34.06		67.47	0.00				
	09/11/91	34.70		66.83	0.00				
	10/08/91	37.63		63.90	0.00				
	11/08/91	35.73		65.80	0.00				
	12/11/91	34.99		66.54	0.00				
	01/13/92	34.34		67.19	0.00				
	02/11/92	34.54		66.99	0.00				
	03/11/92	32.42		69.11	0.00				
	04/13/92	30.46		71.07	0.00				
	05/15/92	30.80		70.73	0.00				
	06/15/92	31.82		69.71	0.00				
	07/16/92	33.01		68.52	0.00				
	08/18/92	32.90		68.63	0.00				
	09/18/92	33.60		67.93	0.00				
	12/08/92	33.07		68.46	0.00				
	03/10/93	26.87		74.66	0.00				
	06/04/93	25.39		76.14	0.00				
	10/14/93	29.90		71.63	0.00				
	04/11/94	26.70		74.83	0.00				
	10/19/94	15.56		85.97	0.00				
	04/11/95	19.87		81.66	0.00				
	03/06/96	19.03		82.50	0.00				
	10/14/96	22.90	101.42	78.52	0.00				Top of casing re-surveyed.
	04/10/97	19.06		82.36	0.00				
	10/29/97	23.91		77.51	0.00				
	04/07/98	15.15		86.27	0.00				
	10/07/98	19.02		82.40	0.00				
	04/07/99	14.39		87.03	0.00				
	10/19/99	19.40		82.02	0.00				
	04/26/00	13.78	144.85	87.64	0.00				Top of casing re-surveyed.
	10/30/00	17.90		126.95	0.00				
	02/01/01	16.78		128.07	0.00				
	04/23/01	17.25		127.60	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-8	07/23/01	19.18	144.85	125.67	0.00	49 - 59	47.5 - 59	0 - 47.5	
	10/23/01	21.80		123.05	0.00				
	01/21/02	14.21	147.50	133.29	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	15.82		131.68	0.00				
	07/22/02	15.50		132.00	0.00				
	10/22/02	18.70		128.80	0.00				
	01/27/03	14.85		132.65	0.00				
	04/21/03	14.80		132.70	0.00				
	07/21/03	16.30		131.20	0.00				
	01/20/04	14.31		133.19	0.00				
	07/19/04	15.65		131.85	0.00				
	01/18/05	12.65		134.85	0.00				
MW-9	10/14/96	16.40	100.29	83.89	0.00	8 - 26	7 - 26	0 - 7	
	04/10/97	12.98		87.31	0.00				
	10/29/97	16.06		84.23	0.00				
	04/07/98	10.31		89.98	0.00				
	10/07/98	14.48		85.81	0.00				
	04/07/99	10.90		89.39	0.00				
	10/19/99	14.65		82.08	0.00				
	04/26/00	11.51		88.78	0.00				
	10/30/00	14.42	144.66	130.24	0.00				Top of casing elevation surveyed.
	02/01/01	14.12		130.54	0.00				
	04/23/01	15.54		129.12	0.00				
	07/23/01	16.45		128.21	0.00				
	10/23/01	18.80		125.86	0.00				
	01/21/02	15.52	147.31	131.79	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	14.64		132.67	0.00				
	07/22/02	17.55		129.76	0.00				
	10/22/02	16.00		131.31	0.00				
	01/27/03	13.64		133.67	0.00				
	04/21/03	13.75		133.56	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-9	07/21/03	14.60	147.31	132.71	0.00	8 - 26	7 - 26	0 - 7	
	01/20/04	13.12		134.19	0.00				
	07/19/04	14.36		132.95	0.00				
	01/18/05	11.76		135.55	0.00				
MW-10	04/10/99	12.04	102.04	0.00	0.00	5 - 20	4.5 - 20	0 - 4.5	
	10/19/99	13.33		0.00	0.00				
	04/26/00	9.55		---	0.00				
	10/30/00	10.25	145.40	135.15	0.00				Top of casing elevation surveyed.
	02/01/01	11.37		134.03	0.00				
	04/23/01	13.92		131.48	0.00				
	07/23/01	14.75		130.65	0.00				
	10/23/01	17.21		128.19	0.00				
	01/21/02	13.00	148.05	135.05	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	14.05		134.00	0.00				
	07/22/02	14.30		133.75	0.00				
	10/22/02	14.70		133.35	0.00				
	01/27/03	12.62		135.43	0.00				
	04/21/03	12.81		135.24	0.00				
	07/21/03	13.75		134.30	0.00				
	01/20/04	11.71		136.34	0.00				
	07/19/04	13.36		134.69	0.00				
	01/18/05	10.05		138.00	0.00				
	07/12/05	11.60		136.45	0.00				
MW-11	05/08/00	18.21	101.74	83.53	0.00	15-35	13-35	0-13	
	06/07/00	19.05		82.69	0.00				
	10/30/00	23.70	146.37	122.67	0.00				Top of casing elevation surveyed.
	02/01/01	21.73		124.64	0.00				
	04/23/01	20.21		126.16	0.00				
	07/23/01	22.69		123.68	0.00				
	10/23/01	25.65		120.72	0.00				
	01/21/02	17.95	149.02	131.07	0.00				Top of casing elevations were surveyed for EDF compliance.

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-11	04/25/02	17.35	149.02	131.67	0.00	15-35	13-35	0-13	
	07/22/02	20.10		128.92	0.00				
	10/22/02	21.91		127.11	0.00				
	01/27/03	17.32		131.70	0.00				
	04/21/03	16.36		132.66	0.00				
	07/21/03	18.08		130.94	0.00				
	01/20/04	16.27		132.75	0.00				
	07/19/04	---		---	---				
MW-12	05/08/00	20.75	101.15	80.40	0.00	10 - 30	8 - 30	0 - 8	
	06/07/00	21.25	146.38	79.90	0.00				
	10/30/00	25.43		120.95	0.00				Top of casing elevation surveyed.
	02/01/01	24.27		122.11	0.00				
	04/23/01	22.00		124.38	0.00				
	07/23/01	24.11		122.27	0.00				
	10/23/01	26.38		120.00	0.00				
	01/21/02	19.70	149.03	129.33	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	18.91		130.12	0.00				
	07/22/02	21.21		127.82	0.00				
	10/22/02	23.98		125.05	0.00				
	01/27/03	18.75		130.28	0.00				
	04/21/03	17.81		131.22	0.00				
	07/21/03	19.71		129.32	0.00				
	01/20/04	18.43		130.60	0.00				
	07/19/04	18.39		130.64	0.00				
	01/18/05	16.94		132.09	0.00				
MW-13	05/08/00	22.60	101.81	79.21	0.00	10 - 30	8 - 30	0 - 8	
	06/07/00	23.03	147.32	78.78	0.00				
	10/30/00	27.14		120.18	0.00				Top of casing elevation surveyed.
	02/01/01	26.11		121.21	0.00				
	04/23/01	23.56		123.76	0.00				
	07/23/01	25.76		121.56	0.00				
	10/23/01	27.60		119.72	0.00				Monitoring well has been abandoned.

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-14	05/08/00	20.37	99.77	79.40	0.00	10-30	8-30	0-8	
	06/07/00	20.72		79.05	0.00				
	10/30/00	24.61	144.96	120.35	0.00				Top of casing elevation surveyed.
	02/01/01	23.57		121.39	0.00				
	04/23/01	21.13		123.83	0.00				
	07/23/01	23.18		121.78	0.00				
	10/23/01	25.50		119.46	0.00				Monitoring well has been abandoned.
MW-15	05/08/00	13.51	---	---	0.00	8-25	7-25	0-7	
	06/07/00	13.73	101.06	87.33	0.00				
	10/30/00	14.64	145.44	130.80	0.00				Top of casing elevation surveyed.
	02/01/01	15.04		130.40	0.00				
	04/23/01	16.72		128.72	0.00				
	07/23/01	19.62		125.82	0.00				
	10/23/01	22.17		123.27	0.00				
	01/21/02	14.80	148.09	133.29	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	14.88		133.21	0.00				
	07/22/02	16.47		131.62	0.00				
	10/22/02	18.84		129.25	0.00				
	01/27/03	13.88		134.21	0.00				
	04/21/03	13.31		134.78	0.00				
	07/21/03	14.11		133.98	0.00				
	01/20/04	13.15		134.94	0.00				
	07/19/04	13.12		134.97	0.00				
	01/18/05	11.58		136.51	0.00				
	07/12/05	11.23		136.86	0.00				
MW-16	05/08/00	14.85	---	---	0.00	8-25	7-25	0-7	
	06/07/00	15.53	102.58	87.05	0.00				
	10/30/00	18.77	147.68	128.91	0.00				Top of casing elevation surveyed.
	02/01/01	18.17		129.51	0.00				
	04/23/01	14.58		133.10	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/Grout Interval	Notes
MW-16	07/23/01	24.26	147.68	123.42	0.00	8-25	7-25	0-7	
	10/23/01	23.40		124.28	0.00				
	01/21/02	14.11	150.33	136.22	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	13.66		136.67	0.00				
	07/22/02	17.60		132.73	0.00				
	10/22/02	18.75		131.58	0.00				
	01/27/03	12.97		137.36	0.00				
	04/21/03	13.98		136.35	0.00				
	07/21/03	14.66		135.67	0.00				
	01/20/04	12.38		137.95	0.00				
	07/19/04	13.41		136.92	0.00				
	01/18/05	11.38		138.95	0.00				
	07/12/05	11.38		138.95	0.00				
MW-17	05/08/00	7.80	103.65	95.85	0.00	8 - 25	7 - 25	0 - 7	
	06/07/00	8.51		95.14	0.00				
	10/30/00	17.00	148.28	131.28	0.00				Top of casing elevation surveyed.
	02/01/01	7.86		140.42	0.00				
	04/23/01	8.38		139.90	0.00				
	08/22/01	11.80		136.48	0.00				
	10/23/01	13.15		135.13	0.00				
	01/21/02	7.10	150.93	143.83	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	6.70		144.23	0.00				
	07/22/02	---		---	---				Well was inaccessible
	10/22/02	11.31		139.62	0.00				
	01/27/03	9.55		141.38	0.00				
	04/21/03	---		---	---				Well was inaccessible
	01/20/04	---		---	---				Well was inaccessible
	07/19/04	---		---	---				
	01/17/05	---		---	---				
	07/12/05	7.07		143.86	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-18	05/08/00	11.20	99.67	88.47	0.00	8 - 25	7 - 25	0 - 7	
	06/07/00	11.56		88.11	0.00				
	10/30/00	14.79	144.14	129.35	0.00				Top of casing elevation surveyed.
	02/01/01	13.91		130.23	0.00				
	04/23/01	13.30		130.84	0.00				
	07/23/01	14.71		129.43	0.00				
	10/23/01	18.15		125.99	0.00				
	01/21/02	12.15	146.79	134.64	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	12.29		134.50	0.00				
	07/22/02	13.76		133.03	0.00				
	10/22/02	14.76		132.03	0.00				
	01/27/03	11.41		135.38	0.00				
	04/21/03	11.58		135.21	0.00				
	07/21/03	12.71		134.08	0.00				
	01/20/04	11.19		135.60	0.00				
	07/19/04	12.67		134.12	0.00				
	01/17/05	10.91		135.88	0.00				
MW-19	05/08/00	8.95	100.42	91.47	0.00	8 - 25	7 - 25	0 - 7	
	06/07/00	9.62		90.80	0.00				
	10/30/00	12.66	145.18	132.52	0.00				Top of casing elevation surveyed.
	02/01/01	12.65		132.53	0.00				
	04/23/01	10.55		134.63	0.00				
	07/23/01	12.27		132.91	0.00				
	10/23/01	13.92		131.26	0.00				
	01/21/02	9.44	147.83	138.39	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	9.61		138.22	0.00				
	07/22/02	10.65		137.18	0.00				
	10/22/02	11.66		136.17	0.00				
	01/27/03	9.60		138.23	0.00				
	04/21/03	9.16		138.67	0.00				
	07/21/03	9.55		138.28	0.00				
	01/20/04	9.20		138.63	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
MW-19	07/19/04	10.68	147.83	137.15	0.00	8 - 25	7 - 25	0 - 7	
	01/17/05	9.33		138.50	0.00				
MW-20	06/07/00	9.47	103.13	93.66	0.00	10-25	8-25	6-8	
	10/30/00	11.81	147.48	135.67	0.00				Top of casing elevation surveyed.
	2/15/01	11.42		136.06	0.00				
	4/23/01	---		---	---				
	07/23/01	12.37		135.11	0.00				
	10/23/01	13.45		134.03	0.00				
	01/21/02	9.68	150.13	140.45	0.00				Top of casing elevations were surveyed for CDF compliance.
	04/25/02	---		---	---				Well was inaccessible
	07/22/02	11.41		138.72	0.00				
	10/22/02	11.98		138.15	0.00				
	01/27/03	10.78		139.35	0.00				
	04/21/03	9.87		140.26	0.00				
	07/21/03	12.16		137.97	0.00				
	01/20/04	8.94		141.19	0.00				
	07/19/04	10.78		139.35	0.00				
	01/17/05	8.98		141.15	0.00				
V-1	06/13/91	21.89	102.53	80.64	0.00	15.5 - 25.5	13.5 - 25.5	0 - 13.5	
	07/09/91	21.91		80.62	0.00				
	08/01/91	21.34		81.19	0.00				
	08/29/91	21.10		81.43	0.00				
	09/11/91	21.25		81.28	0.00				
	10/08/91	22.88		79.65	0.00				
	11/08/91	22.15		80.38	0.00				
	12/11/91	---		---	---				
	01/13/92	21.28		81.25	0.00				
	02/11/92	18.75		83.78	0.00				
	03/11/92	13.54		88.99	0.00				
	04/13/92	14.52		88.01	0.00				
	05/15/92	15.18		87.35	0.00				
	06/15/92	16.29		86.24	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
V-1	07/16/92	17.22	102.53	85.31	0.00	15.5 - 25.5	13.5 - 25.5	0 - 13.5	
	08/18/92	17.08		85.45	0.00				
	09/18/92	18.25		84.28	0.00				
	12/08/92	17.80		84.73	0.00				
	03/10/93	15.59		86.94	0.00				
	06/04/93	14.97		87.56	0.00				
	10/14/93	14.66		87.87	0.00				
	04/11/94	14.00		88.53	0.00				
	10/19/94	13.92		88.61	0.00				
	04/11/95	9.28		93.25	0.00				
	03/06/96	9.72		92.81	0.00				
	10/14/96	11.91	102.51	90.60	0.00				Top of casing elevations were surveyed.
	04/09/97	10.48		92.03	0.00				
	10/29/97	13.96		88.57	0.02				
	04/07/98	8.01		94.50	0.00				
	10/07/98	11.10		91.41	0.00				
	04/07/99	8.15		94.36	0.00				
	10/19/99	11.49		91.02	0.00				
	04/26/00	8.64		93.87	0.00				
	10/30/00	11.85	146.85	135.00	0.00				Top of casing elevations were surveyed.
	02/26/01	12.55		134.30	0.00				
	04/23/01	13.14		133.71	0.00				
	07/23/01	13.73		133.12	0.00				
	10/23/01	14.85		132.00	0.00				
	01/21/02	11.70	149.50	137.80	0.00				Top of casing elevations were surveyed for EDF compliance.
	04/25/02	11.65		137.85	0.00				
	07/22/02	12.52		136.98	0.00				
	10/22/02	12.90		136.60	0.00				
	01/27/03	11.43		138.07	0.00				
	04/21/03	11.44		138.06	0.00				
	07/21/03	12.08		137.42	0.00				
	01/20/04	10.54		138.96	0.00				
	07/19/04	11.92		137.58	0.00				
	01/17/05	10.21		139.29	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite Grout Interval	Notes
V-1	07/12/05	9.96		139.54	0.00				
V-2	06/13/91	---	101.13	---	---	8 - 23	7 - 23	0	
	07/09/91	---		---	---				
	08/01/91	---		---	---				
	08/29/91	---		---	---				
	09/11/91	---		---	---				
	10/08/91	---		---	---				
	11/08/91	---		---	---				
	12/11/91	---		---	---				
	01/13/92	18.39		82.74	0.00				
	02/11/92	21.16		79.97	0.00				
	03/11/92	16.86		84.27	0.00				
	04/13/92	17.03		84.10	0.00				
	05/15/92	17.78		83.35	0.00				
	06/15/92	21.44		79.69	0.00				
	07/16/92	---		---	---				
	08/18/92	---		---	---				
	09/18/92	---		---	---				
	12/08/92	19.41		81.72	0.00				
	03/10/93	13.62		87.51	0.00				
	06/04/93	12.98		88.15	0.00				
	10/14/93	---		---	---				
	04/11/94	20.11		81.02	0.00				
	10/19/94	---		---	---				
	04/11/95	12.14		88.99	0.00				
	03/06/96	13.01		88.12	0.00				
	10/14/96	16.04	100.82	84.78	0.00				
	04/09/97	13.46		87.36	0.00				
	10/29/97	17.24		83.58	0.00				
	04/07/98	8.01		94.50	0.00				
	10/07/98	13.68		87.14	0.00				
	04/07/99	10.56		90.26	0.00				
	10/19/99	13.96		86.86	0.00				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

Well ID	Sample Date	TOC (Ft, msl)	DTW (Ft)	GWE (Ft, msl)	Product (ft)	Screen Interval	Sand Pack Interval	Bentonite/ Grout Interval	Notes
V-2	04/26/00	9.31	100.82	91.51	0.00	8 - 23	7 - 23	0 - 7	
	10/30/00	11.75	143.85	132.10	0.00				Top of casing elevations were surveyed.
	02/26/01	10.36		133.49	0.00				
	04/23/01	15.10		128.75	0.00				
	08/22/01	15.48		128.37	0.00				Well has been switched to a SVE (soil vapor extraction) well.
DW-1	06/13/91	37.82	102.64	64.82	0.00	140 - 180	61 - 180	0 - 61	Well has been abandoned.
	07/09/91	37.82		64.82	0.00				
	08/01/91	92.26		10.38	0.00				
	08/29/91	50.13		52.51	0.00				
	09/11/91	39.72		62.92	0.00				
	10/08/91	39.31		63.33	0.00				
	11/09/91	38.90		63.74	0.00				
	12/11/91	39.96		62.68	0.00				
	12/08/92	37.75		64.89	0.00				
	03/10/93	32.60		70.04	0.00				
	06/04/93	32.35		70.29	0.00				
	10/14/93	---		---	---				
DW-2	03/09/74	---	---	---	---	94 - 134	unknown	0 - 20	Well has been abandoned.
	10/17/95	---		---	---				
	10/21/96	---		---	---				
	04/10/97	---		---	---				
	10/30/97	---		---	---				
	04/08/98	---		---	---				
	10/07/98	---		---	---				
	04/07/99	---		---	---				
	08/30/99	23.23		---	0.48				

Table 1. Water Level Data/Well Construction Details - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA

EXPLANATION:

DTW = Depth to water
ft = feet
msl = mean sea level
TOC = Top of casing elevation
GWE = Ground water elevation
— = Not applicable

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-21	24	2/26/01	15.0	146	131.0	23 - 24
	50	2/26/01	17.0		129.0	49 - 50
	75	2/26/01	17.0		129.0	74 - 75
	110	2/26/01	21.5		124.5	109 - 110
	143	2/26/01	21.5		124.5	142 - 143
	158	2/26/01	21.5		124.5	157 - 158
	165.5	2/26/01	21.5		124.5	164.5 - 165.5
	24	4/26/01	15.73	145.79 ¹	130.06	23 - 24
	50	4/26/01	12.40		133.39	49 - 50
	75	4/26/01	17.46		128.33	74 - 75
	110	4/26/01	20.84		124.95	109 - 110
	143	4/26/01	20.97		124.82	142 - 143
	158	4/26/01	20.98		124.81	157 - 158
	165.5	4/26/01	21.02		124.77	164.5 - 165.5
	24	7/25/01	19.64		126.15	23 - 24
	50	7/25/01	18.58		127.21	49 - 50
	75	7/25/01	19.45		126.34	74 - 75
	110	7/25/01	23.51		122.28	109 - 110
	143	7/25/01	23.67		122.28	142 - 143
	158	7/25/01	23.66		122.13	157 - 158
	165.5	7/25/01	23.89		121.90	164.5 - 165.5
	24	10/25/01	17.82		127.97	23 - 24
	50	10/25/01	21.85		123.94	49 - 50
	75	10/25/01	21.95		123.84	74 - 75
	110	10/25/01	25.72		120.07	109 - 110
	143	10/25/01	25.88		119.91	142 - 143
	158	10/25/01	25.85		119.94	157 - 158
	165.5	10/25/01	25.88		119.91	164.5 - 165.5
	24	1/24/02	16.85	148.44 ²	131.59	23 - 24
	75	1/24/02	16.20		132.24	74 - 75
	143	1/24/02	19.10		129.34	142 - 143
	165.5	1/24/02	19.20		129.24	164.5 - 165.5
	24	4/26/02	17.18		131.26	23 - 24
	75	4/26/02	16.17		132.27	74 - 75

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-21 cont	143	4/26/02	16.50	148.44	131.94	142 - 143
	165.5	4/26/02	18.55		129.89	164.5 - 165.5
	24	7/22/02	17.50		130.94	23 - 24
	75	7/22/02	17.75		130.69	74 - 75
	143	7/22/02	20.88		127.56	142 - 143
	165.5	7/22/02	20.95		127.49	164.5 - 165.5
	24	10/23/02	17.81		130.63	23 - 24
	75	10/23/02	18.92		129.52	74 - 75
	143	10/23/02	19.55		128.89	142 - 143
	165.5	10/23/02	22.65		125.79	164.5 - 165.5
	24	1/27/03	16.00		132.44	23 - 24
	75	1/27/03	15.10		133.34	74 - 75
	143	1/27/03	15.75		132.69	142 - 143
	165.5	1/27/03	15.78		132.66	164.5 - 165.5
	24	4/21/03	15.57		132.87	23 - 24
	75	4/21/03	14.89		133.55	74 - 75
	143	4/21/03	17.17		131.27	142 - 143
	165.5	4/21/03	17.19		131.25	164.5 - 165.5
	24	7/21/03	16.27		132.17	23 - 24
	75	7/21/03	16.16		132.28	74 - 75
	143	7/21/03	19.44		129.00	142 - 143
	165.5	7/21/03	19.52		128.92	164.5 - 165.5
	24	1/20/04	14.51		133.93	23 - 24
	75	1/20/04	14.74		133.70	74 - 75
	143	1/20/04	15.87		132.57	142 - 143
	165.5	1/20/04	15.77		132.67	164.5 - 165.5
	24	7/19/04	15.45		132.99	23 - 24
	75	7/19/04	15.76		132.68	74 - 75
	143	7/19/04	18.18		130.26	142 - 143
	165.5	7/19/04	18.26		130.18	164.5 - 165.5
	24	1/20/05	11.83		136.61	23 - 24
	75	1/20/05	13.12		135.32	74 - 75
	143	1/20/05	16.12		132.32	142 - 143
	165.5	1/20/05	15.96		132.48	164.5 - 165.5

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-21 cont.	24	7/12/05	11.86	148.44	136.58	23 - 24
	75	7/12/05	12.77		135.67	74 - 75
	143	7/12/05	14.65		133.79	142 - 143
	165.5	7/12/05	14.70		133.74	164.5 - 165.5
MW-22	22	2/26/01	17.0	145.50	128.5	21 - 22
	47	2/26/01	21.0		124.5	46 - 47
	72.5	2/26/01	21.5		124.0	71.5 - 72.5
	113	2/26/01	21.5		124.0	112 - 113
	144	2/26/01	21.5		124.0	143 - 144
	164.5	2/26/01	21.5		124.0	163.5 - 164.5
	177.5	2/26/01	43.0		102.5	176.5 - 177.5
	22	4/27/01	20.30	145.45 ¹	125.15	21 - 22
	47	4/27/01	20.69		124.76	46 - 47
	72.5	4/27/01	20.39		125.06	71.5 - 72.5
	113	4/27/01	17.88		127.57	112 - 113
	144	4/27/01	20.75		124.70	143 - 144
	164.5	4/27/01	20.79		124.66	163.5 - 164.5
	177.5	4/27/01	10.55		134.90	176.5 - 177.5
	22	7/25/01	20.61		124.84	21 - 22
	47	7/25/01	19.95		125.50	46 - 47
	72.5	7/25/01	23.22		122.23	71.5 - 72.5
	113	7/25/01	23.32		122.13	112 - 113
	144	7/25/01	23.35		122.10	143 - 144
	164.5	7/25/01	23.40		122.05	163.5 - 164.5
	177.5	7/25/01 ²	—		---	176.5 - 177.5
	22	10/25/01 ³	—		---	21 - 22
	47	10/25/01	24.97		120.48	46 - 47
	72.5	10/25/01	25.40		120.05	71.5 - 72.5
	113	10/25/01	25.46		119.99	112 - 113
	144	10/25/01	25.50		119.95	143 - 144
	164.5	10/25/01	25.60		119.85	163.5 - 164.5
	177.5	10/25/01 ²	—		---	176.5 - 177.5

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-22 cont	22	1/24/02	18.70	148.10 ^d	129.40	21 - 22
	72.5	1/24/02	18.75		129.35	71.5 - 72.5
	144	1/24/02	18.82		129.28	143 - 144
	177.5	1/24/02	18.85		129.25	163.5 - 164.5
	22	4/26/02	18.61		129.49	21 - 22
	72.5	4/26/02	18.10		130.00	71.5 - 72.5
	144	4/26/02	18.12		129.98	143 - 144
	164.5	4/26/02	18.14		129.96	163.5 - 164.5
	22	7/22/02	19.35		128.75	21 - 22
	72.5	7/22/02	20.25		127.85	71.5 - 72.5
	144	7/22/02	20.57		127.53	143 - 144
	164.5	7/22/02	20.57		127.53	163.5 - 164.5
	22	10/23/02	dry		---	21 - 22
	72.5	10/23/02	22.25		125.85	71.5 - 72.5
	144	10/23/02	22.27		125.83	143 - 144
	164.5	10/23/02	22.30		125.80	163.5 - 164.5
	22	1/27/03	13.80		134.30	21 - 22
	72.5	1/27/03	17.42		130.68	71.5 - 72.5
	144	1/27/03	17.52		130.58	143 - 144
	164.5	1/27/03	17.53		130.57	163.5 - 164.5
	22	4/21/03	14.21		133.89	21 - 22
	72.5	4/21/03	16.88		131.22	71.5 - 72.5
	144	4/21/03	16.90		131.20	143 - 144
	164.5	4/21/03	16.90		131.20	163.5 - 164.5
	22	7/21/03	15.18		132.92	21 - 22
	72.5	7/21/03	19.00		129.10	71.5 - 72.5
	144	7/21/03	19.13		128.97	143 - 144
	164.5	7/21/03	19.13		128.97	163.5 - 164.5
	22	1/20/04	13.48		134.62	21 - 22
	72.5	1/20/04	17.41		130.69	71.5 - 72.5
	144	1/20/04	17.48		130.62	143 - 144
	164.5	1/20/04	17.48		130.62	163.5 - 164.5
	22	7/19/04	18.38		129.72	21 - 22
	72.5	7/19/04	17.69		130.41	71.5 - 72.5

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-22 cont.	144	7/19/04	17.83	148.10	130.27	143 - 144
	164.5	7/19/04	17.82		130.28	163.5 - 164.5
	22	1/20/05	11.73		136.37	21 - 22
	72.5	1/20/05	15.44		132.66	71.5 - 72.5
	144	1/20/05	15.60		132.50	143 - 144
	164.5	1/20/05	15.61		132.49	163.5 - 164.5
	22	7/12/05	16.40		131.70	21 - 22
	72.5	7/12/05	14.28		133.82	71.5 - 72.5
	144	7/12/05	14.37		133.73	143 - 144
	164.5	7/12/05	14.38		133.72	163.5 - 164.5
MW-23	25	2/26/01	22.5	146.50	124.0	24 - 25
	50	2/26/01	23.0		123.5	49 - 50
	75	2/26/01	23.0		123.5	74 - 75
	120.5	2/26/01	23.5		123.0	119.5 - 120.5
	148.5	2/26/01	23.5		123.0	147.5 - 148.5
	163.5	2/26/01	23.0		123.5	162.5 - 163.5
	180	2/26/01	23.5		123.0	179 - 18
	25	4/30/01	21.70	146.53 ¹	124.83	24 - 25
	50	4/30/01	21.76		124.77	49 - 50
	75	4/30/01	21.80		124.73	74 - 75
	120.5	4/30/01	22.86		123.67	119.5 - 120.5
	148.5	4/30/01	22.41		124.12	147.5 - 148.5
	163.5	4/30/01	20.09		126.44	162.5 - 163.5
	180	4/30/01	22.29		124.24	179 - 180
	25	7/25/01	24.77		121.76	24 - 25
	50	7/25/01	24.46		122.07	49 - 50
	75	7/25/01	24.47		122.06	74 - 75
	120.5	7/25/01	24.65		121.88	119.5 - 120.5
	148.5	7/25/01	24.75		121.78	147.5 - 148.5
	163.5	7/25/01	24.90		121.63	162.5 - 163.5
	180	7/25/01	24.94		121.59	179 - 180
	25	10/25/01	24.75		121.78	24 - 25
	50	10/25/01	26.57		119.96	49 - 50

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-23 cont	75	10/25/01	26.57	146.53 ¹	119.96	74 - 75
	120.5	10/25/01	26.68		119.85	119.5 - 120.5
	148.5	10/25/01	26.54		119.99	147.5 - 148.5
	163.5	10/25/01	26.96		119.57	162.5 - 163.5
	180	10/25/01	26.98		119.55	179 - 180
	25	1/24/02	20.13	149.18 ⁴	129.05	24 - 25
	75	1/24/02	20.00		129.18	74 - 75
	148.5	1/24/02	20.60		128.58	147.5 - 148.5
	180	1/24/02	20.35		128.83	179 - 180
	25	4/26/02	19.10		130.08	24 - 25
	75	4/26/02	19.15		130.03	74 - 75
	148.5	4/26/02	19.27	149.18	129.91	147.5 - 148.5
	180	4/26/02	19.40		129.78	179 - 180
	25	7/22/02	21.27		127.91	24 - 25
	75	7/22/02	21.56		127.62	74 - 75
	148.5	7/22/02	20.65		128.53	147.5 - 148.5
	180	7/22/02	21.85		127.33	179 - 180
	25	10/23/02	dry		---	24 - 25
	75	10/23/02	23.28		125.90	74 - 75
	148.5	10/23/02	22.50		126.68	147.5 - 148.5
	180	10/23/02	23.62		125.56	179 - 180
	25	1/27/03	18.43		130.75	24 - 25
	75	1/27/03	18.55		130.63	74 - 75
	148.5	1/27/03	19.04		130.14	147.5 - 148.5
	180	1/27/03	18.85		130.33	179 - 180
	25	4/21/03	18.05	149.18	131.13	24 - 25
	75	4/21/03	18.02		131.16	74 - 75
	148.5	4/21/03	18.30		130.88	147.5 - 148.5
	180	4/21/03	18.18		131.00	179 - 180
	25	7/21/03	19.74		129.44	24 - 25
	75	7/21/03	20.02		129.16	74 - 75
	148.5	7/21/03	19.00		130.18	147.5 - 148.5
	180	7/21/03	20.40		128.78	179 - 180
	25	1/20/04	18.61		130.57	24 - 25

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-23 cont	75	1/20/04	18.69	149.18	130.49	74 - 75
	148.5	1/20/04	18.83		130.35	147.5 - 148.5
	180	1/20/04	18.89		130.29	179 - 180
	25	7/19/04	18.34		130.84	24 - 25
	75	7/19/04	18.60		130.58	74 - 75
	148.5	7/19/04	18.74		130.44	147.5 - 148.5
	180	7/19/04	19.07		130.11	179 - 180
	25	1/20/05	16.45		132.73	24 - 25
	75	1/20/05	16.61		132.57	74 - 75
	148.5	1/20/05	17.05		132.13	147.5 - 148.5
	180	1/20/05	17.03		132.15	179 - 180
	25	7/12/05	15.09		134.09	24 - 25
	75	7/12/05	15.17		134.01	74 - 75
	148.5	7/12/05	15.52		133.66	147.5 - 148.5
	180	7/12/05	15.59		133.59	179 - 180
MW-24	23	2/26/01	19.0	147.00	128.0	22 - 23
	48	2/26/01	22.5		124.5	47 - 48
	73	2/26/01	22.5		124.5	72 - 73
	113	2/26/01	23.0		124.0	112 - 113
	146	2/26/01	23.5		123.5	145 - 146
	161	2/26/01	23.5		123.5	160 - 161
	178	2/26/01	23.5		123.5	177 - 178
	23	5/1/01	16.40	147.14 ¹	130.74	22 - 23
	48	5/1/01	21.43		125.71	47 - 48
	73	5/1/01	21.51		125.63	72 - 73
	113	5/1/01	21.85		125.29	112 - 113
	146	5/1/01	22.21		124.93	145 - 146
	161	5/1/01	22.43		124.71	160 - 161
	178	5/1/01	22.39		124.75	177 - 178
	23	7/25/01	20.22		126.92	22 - 23
	48	7/25/01	24.10		123.04	47 - 48
	73	7/25/01	24.15		122.99	72 - 73
	113	7/25/01	24.59		122.55	112 - 113

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-24	146	7/25/01	25.02	147.14 ¹	122.12	145 - 146
	161	7/25/01	25.25		121.89	160 - 161
	178	7/25/01	25.26		121.88	177-178
	23	10/25/01 ³	—		---	22 - 23
	48	10/25/01	22.77		124.37	47 - 48
	73	10/25/01	26.78		120.36	72 - 73
	113	10/25/01	26.90		120.24	112 - 113
	146	10/25/01	27.35		119.79	145 - 146
	161	10/25/01	27.45		119.69	160 - 161
	178	10/25/01	27.44		119.70	177-178
	23	1/25/02	22.10	149.79 ⁴	127.69	22 - 23
	73	1/25/02	20.20		129.59	72 - 73
	146	1/25/02	20.30		129.49	145 - 146
	178	1/25/02	20.15		129.64	177 - 178
	23	4/26/02	17.72		132.07	22 - 23
	73	4/26/02	19.12		130.67	72 - 73
	146	4/26/02	19.83		129.96	145 - 146
	178	4/26/02	19.90		129.89	177 - 178
	23	7/22/02	19.66		130.13	22 - 23
	73	7/22/02	21.55		128.24	72 - 73
	146	7/22/02	22.26		127.53	145 - 146
	178	7/22/02	22.35		127.44	177 - 178
	23	10/23/02	21.22		128.57	22 - 23
	73	10/23/02	23.35		126.44	72 - 73
	146	10/23/02	24.20		125.59	145 - 146
	178	10/23/02	24.20		125.59	177 - 178
	23	1/27/03	17.56		132.23	22 - 23
	73	1/27/03	18.04		131.75	72 - 73
	146	1/27/03	19.24		130.55	145 - 146
	178	1/27/03	19.02		130.77	177 - 178
	23	4/21/03	16.38		133.41	22 - 23
	73	4/21/03	17.67		132.12	72 - 73
	146	4/21/03	18.35		131.44	145 - 146
	178	4/21/03	18.44		131.35	177 - 178

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-25	25	1/28/02	17.92	149.92 ⁴	132.00	24.5 - 25.5
	75	1/28/02	20.72		129.20	74.5 - 75.5
	145	1/28/02	20.85		129.07	144.5 - 145.5
	180	1/28/02	20.82		129.10	179.5 - 180.5
	230	1/28/02	20.95		128.97	229.5 - 230.5
	25	4/26/02	17.16		132.76	24.5 - 25.5
	75	4/26/02	20.04		129.88	74.5 - 75.5
	145	4/26/02	20.30		129.62	144.5 - 145.5
	180	4/26/02	20.00		129.92	179.5 - 180.5
	230	4/26/02	20.20		129.72	229.5 - 230.5
	25	7/22/02	18.20		131.72	24.5 - 25.5
	75	7/22/02	22.41		127.51	74.5 - 75.5
	145	7/22/02	22.47		127.45	144.5 - 145.5
	180	7/22/02	22.50		127.42	179.5 - 180.5
	230	7/22/02	22.61		127.31	229.5 - 230.5
	25	1/27/03	16.93		132.99	24.5 - 25.5
	75	1/27/03	19.62		130.30	74.5 - 75.5
	145	1/27/03	19.75		130.17	144.5 - 145.5
	180	1/27/03	19.62		130.30	179.5 - 180.5
	230	1/27/03	19.77		130.15	229.5 - 230.5
	25	4/21/03	15.89		134.03	24.5 - 25.5
	75	4/21/03	18.89		131.03	74.5 - 75.5
	145	4/21/03	19.03		130.89	144.5 - 145.5
	180	4/21/03	18.77		131.15	179.5 - 180.5
	230	4/21/03	18.89		131.03	229.5 - 230.5
MW-26	25	1/25/02	20.02	148.23 ⁴	128.21	24.5 - 25.5
	75	1/25/02	19.42		128.81	74.5 - 75.5
	145	1/25/02	25.30		122.93	144.5-145.5
	180	1/25/02	25.31		122.92	179.5 - 180.5
	25	4/26/02	19.10		129.13	24.5 - 25.5
	75	4/26/02	18.56		129.67	74.5 - 75.5
	145	4/26/02	24.11		124.12	144.5-145.5
	180	4/26/02	24.00		124.23	179.5 - 180.5

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-26 cont	25	7/22/02	20.58	148.23	127.65	24.5 - 25.5
	75	7/22/02	20.90		127.33	74.5 - 75.5
	145	7/22/02	26.87		121.36	144.5-145.5
	180	7/22/02	26.75		121.48	179.5 - 180.5
	25	1/27/03	19.10		129.13	24.5 - 25.5
	75	1/27/03	18.11		130.12	74.5 - 75.5
	145	1/27/03	24.22		124.01	144.5-145.5
	180	1/27/03	24.74		123.49	179.5 - 180.5
	25	4/21/03	18.18		130.05	24.5 - 25.5
	75	4/21/03	17.36		130.87	74.5 - 75.5
	145	4/21/03	23.12		125.11	144.5-145.5
	180	4/21/03	23.50		124.73	179.5 - 180.5
	25	1/20/04	18.89		129.34	24.5 - 25.5
	75	1/20/04	18.19		130.04	74.5 - 75.5
	145	1/20/04	---		---	144.5-145.5
	180	1/20/04	---		---	179.5 - 180.5
	25	7/19/04	18.02		130.21	24.5 - 25.5
	75	7/19/04	18.19		130.04	74.5 - 75.5
	145	7/19/04	20.09		128.14	144.5-145.5
	180	7/19/04	20.16		128.07	179.5 - 180.5
	25	1/19/05	17.17		131.06	24.5 - 25.5
	75	1/19/05	16.46		131.77	74.5 - 75.5
MW-27	25	1/28/02	10.95	147.65 ⁴	136.70	24.5 - 25.5
	75	1/28/02	12.50		135.15	74.5 - 75.5
	145	1/28/02	14.80		132.85	144.5 - 145.5
	180	1/28/02	14.80		132.85	179.5 - 180.5
	230	1/28/02	19.82		127.83	229.5-230.5
	25	4/26/02	10.32		137.33	24.5 - 25.5
	75	4/26/02	11.45		136.20	74.5 - 75.5
	145	4/26/02	15.32		132.33	144.5 - 145.5
	180	4/26/02	16.31		131.34	179.5 - 180.5
	230	4/26/0228	18.52		129.13	229.5-230.5
	25	7/22/02	11.04		136.61	24.5 - 25.5

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-27 cont	75	7/22/02	13.28	147.65	134.37	74.5 - 75.5
	145	7/22/02	17.38		130.27	144.5 - 145.5
	180	7/22/02	17.40		130.25	179.5 - 180.5
	230	7/22/02	21.10		126.55	229.5-230.5
	25	10/23/02	12.32		135.33	24.5 - 25.5
	75	10/23/02	14.45		133.20	74.5 - 75.5
	145	10/23/02	18.86		128.79	144.5 - 145.5
	180	10/23/02	18.87		128.78	179.5 - 180.5
	230	10/23/02	23.25		124.40	229.5-230.5
	25	1/27/03	9.14		138.51	24.5 - 25.5
	75	1/27/03	10.89		136.76	74.5 - 75.5
	145	1/27/03	13.89		133.76	144.5 - 145.5
	180	1/27/03	14.01		133.64	179.5 - 180.5
	230	1/27/03	18.07		129.58	229.5-230.5
	25	4/21/03	---		---	24.5 - 25.5
	75	4/21/03	---		---	74.5 - 75.5
	145	4/21/03	---		---	144.5 - 145.5
	180	4/21/03	---		---	179.5 - 180.5
	230	4/21/03	---		---	229.5-230.5
MW-28	25	1/25/02	21.90	150.23 ⁴	128.33	24.5 - 25.5
	75	1/25/02	21.70		128.53	74.5 - 75.5
	145	1/25/02	21.60		128.63	144.5-145.5
	180	1/25/02	21.50		128.73	179.5-180.5
	25	4/26/02	20.40		129.83	24.5 - 25.5
	75	4/26/02	20.52		129.71	74.5 - 75.5
	145	4/26/02	20.60		129.63	144.5-145.5
	180	4/26/02	20.51		129.72	179.5-180.5
	25	7/22/02	DRY		---	24.5 - 25.5
	75	7/22/02	22.73		127.50	74.5 - 75.5
	145	7/22/02	22.83		127.40	144.5-145.5
	180	7/22/02	22.86		127.37	179.5-180.5
	25	1/27/03	20.36		129.87	24.5 - 25.5
	75	1/27/03	20.12		130.11	74.5 - 75.5

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-28 cont	145	1/27/03	20.10	150.23	130.13	144.5-145.5
	180	1/27/03	20.08		130.15	179.5-180.5
	25	4/21/03	19.53		130.70	24.5 - 25.5
	75	4/21/03	19.50		130.73	74.5 - 75.5
	145	4/21/03	19.57		130.66	144.5-145.5
	180	4/21/03	19.31		130.92	179.5-180.5
	25	7/21/03	21.09		129.14	24.5 - 25.5
	75	7/21/03	21.39		128.84	74.5 - 75.5
	145	7/21/03	21.49		128.74	144.5-145.5
	180	7/21/03	21.49		128.74	179.5-180.5
	25	1/20/04	20.35		129.88	24.5 - 25.5
	75	1/20/04	20.30		129.93	74.5 - 75.5
	145	1/20/04	---		---	144.5-145.5
	180	1/20/04	---		---	179.5-180.5
	25	7/19/04	20.09		130.14	24.5 - 25.5
	75	7/19/04	20.16		130.07	74.5 - 75.5
	145	7/19/04	---		---	144.5-145.5
	180	7/19/04	---		---	179.5-180.5
	25	1/19/05	19.00		131.23	24.5 - 25.5
	75	1/19/05	18.65		131.58	74.5 - 75.5
MW-29	25	1/25/02	15.92	148.60 ⁴	132.68	24.5 - 25.5
	75	1/25/02	18.92		129.68	74.5 - 75.5
	145	1/25/02	26.21		122.39	144.5 - 145.5
	180	1/25/02	26.21		122.39	179.5 - 180.5
	25	4/26/02	17.34		131.26	24.5 - 25.5
	75	4/26/02	19.48		129.12	74.5 - 75.5
	145	4/26/02	25.02		123.58	144.5 - 145.5
	180	4/26/02	25.03		123.57	179.5 - 180.5
	25	7/22/02	19.22		129.38	24.5 - 25.5
	75	7/22/02	21.82		126.78	74.5 - 75.5
	145	7/22/02	27.82		120.78	144.5 - 145.5
	180	7/22/02	27.80		120.70	179.5 - 180.5
	25	1/27/03	14.95		133.65	24.5 - 25.5

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-29 cont.	75	1/27/03	17.44	148.60	131.16	74.5 - 75.5
	145	1/27/03	25.14		123.46	144.5 - 145.5
	180	1/27/03	25.15		123.45	179.5 - 180.5
	25	4/21/03	15.36		133.24	24.5 - 25.5
	75	4/21/03	17.09		131.51	74.5 - 75.5
	145	4/21/03	24.00		124.60	144.5 - 145.5
	180	4/21/03	24.00		124.60	179.5 - 180.5
	25	1/20/04	15.25		133.35	24.5 - 25.5
	75	1/20/04	17.77		130.83	74.5 - 75.5
	145	1/20/04	---		---	144.5 - 145.5
	180	1/20/04	---		---	179.5 - 180.5
	25	7/19/04	17.80		130.80	24.5 - 25.5
	75	7/19/04	19.16		129.44	74.5 - 75.5
	145	7/19/04	---		---	144.5 - 145.5
	180	7/19/04	---		---	179.5 - 180.5
	25	1/19/05	14.71		133.89	24.5 - 25.5
	75	1/09/05	16.89		131.71	74.5 - 75.5
MW-30	25	1/28/02	18.85	149.63 ⁴	130.78	24.5 - 25.5
	75	1/28/02	20.00		129.63	74.5 - 75.5
	145	1/28/02	20.15		129.48	144.5 - 145.5
	180	1/28/02	20.00		129.63	179.5 - 180.5
	230	1/28/02	20.20		129.43	229.5 - 230.5
	25	4/26/02	18.75		130.88	24.5 - 25.5
	75	4/26/02	19.52		130.11	74.5 - 75.5
	145	4/26/02	19.65		129.98	144.5 - 145.5
	180	4/26/02	19.73		129.90	179.5 - 180.5
	230	4/26/02	19.75		129.88	229.5 - 230.5
	25	7/22/02	20.87		128.76	24.5 - 25.5
	75	7/22/02	21.90		127.73	74.5 - 75.5
	145	7/22/02	22.00		127.63	144.5 - 145.5
	180	7/22/02	22.16		127.47	179.5 - 180.5
	230	7/22/02	22.20		127.43	229.5 - 230.5
	25	1/27/03	17.53		132.10	24.5 - 25.5

Table 2. Water Level Data/Well Construction Details for Multi-Level Wells - Redwood Oil Bulk Plant, 455 Yolanda Ave. Santa Rosa, CA.

Well ID	Sample Depth (in feet)	Date Measured	DTW (ft)	TOC (ft)	GWE	Screen Interval
MW-30 cont	75	1/27/03	18.75	149.63	130.88	74.5 - 75.5
	145	1/27/03	18.97		130.66	144.5 - 145.5
	180	1/27/03	19.00		130.63	179.5 - 180.5
	230	1/27/03	19.07		130.56	229.5 - 230.5
	25	4/21/03	17.23		132.40	24.5 - 25.5
	75	4/21/03	18.17		131.46	74.5 - 75.5
	145	4/21/03	18.34		131.29	144.5 - 145.5
	180	4/21/03	18.43		131.20	179.5 - 180.5
	230	4/21/03	18.45		131.18	229.5 - 230.5
	25	7/21/03 ¹	---		---	24.5 - 25.5
	75	7/21/03	20.42		129.21	74.5 - 75.5
	145	7/21/03	20.67		128.96	144.5 - 145.5
	180	7/21/03	20.82		128.81	179.5 - 180.5
	230	7/21/03	20.85		128.78	229.5 - 230.5
	25	1/20/04	17.44		132.19	24.5 - 25.5
	75	1/20/04	18.79		130.84	74.5 - 75.5
	145	1/20/04	---		---	144.5 - 145.5
	180	1/20/04	---		---	179.5 - 180.5
	230	1/20/04	---		---	229.5 - 230.5
	25	7/19/04	18.18		131.45	24.5 - 25.5
	75	7/19/04	19.25		130.38	74.5 - 75.5
	145	7/19/04	---		---	144.5 - 145.5
	180	7/19/04	---		---	179.5 - 180.5
	230	1/20/04	---		---	229.5 - 230.5
	25	1/19/05	15.99		133.64	24.5 - 25.5
	75	1/19/05	17.13		132.50	74.5 - 75.5

Explanation:

DTW = depth to water

TOC = top of casing elevation

GWE = ground water elevation

Notes:

¹ Top of casing elevation was surveyed by professional land surveyor Barry L. Kolstad, PLS # 5677, on March 19, 2001.

² Unable to insert water level meter past 29.0 feet.

³ Port was dry.

⁴ Top of casing elevations were measured by Barry L. Kolstad, using NAD 83 and NAVD 88 datum points for EDF compliance, on December 21, 2001.

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
		<----- ppb ----->								
MW-1	3/14/1991	----	----	--	--	--	--	--	--	Well was dry.
	6/13/1991	1,300	1,500	4,300	--	160	250	22	130	
	9/11/1991	250	1,300	1,800	--	1	<0.5	<0.5	<0.5	
	12/11/1991	--	--	--	--	--	--	--	--	Well was dry.
	3/11/1992	1,200	3,800	--	--	37	35	25	94	
	6/15/1992	1,900	4,500	--	--	920	1.3	13	3.4	
	9/18/1992	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	12/8/1992	350	2,700	--	--	5.4	<0.5	0.7	<0.5	
	3/10/1993	1,000	4,100	--	--	440	4.5	7.7	14	
	6/4/1993	<50	220	--	--	<0.5	<0.5	<0.5	<0.5	
	10/13/1993	280	--	--	--	12	3.2	1.3	6.5	
	4/11/1994	540	--	--	--	1.7	<0.5	0.5	<0.5	
	10/20/1994	170	--	--	--	2.2	2.7	<0.5	<0.5	
	4/11/1995	260	--	--	--	1	0.7	<0.5	1.1	
	3/6/1996	<250	<50	1,400	<500	7.7	<2.5	<2.5	<2.5	
	10/18/1996	<1,000	1,200	1,300	<50	<10	<10	<10	<10	
	4/9/1997	81	880	870	<50	12	1.4	<0.5	1.2	
	10/29/1997	92	880	1000	<50	4.4	<0.5	<0.5	0.5	
	4/7/1998	10,000	280	<50	<50	51	<0.5	<0.5	100	
	10/7/1998	200	<50	<50	<50	<0.5	<0.5	<0.5	1.5	
	4/7/1999	130	110	<100	<50	<0.5	0.76	0.56	4.2	
	10/19/1999	<5,000	<50	---	<50	<50	<50	<50	<50	
	4/26/2000	---	---	---	---	---	---	---	---	Well inaccessible.
	10/31/2000	120	<50	<50	---	3.8	0.99	2.7	4.7	
	2/2/2001	580	200	<250	---	10	5.3	3.8	29	
	4/23/2001	370	520	600	---	<0.5	0.5	<0.5	<0.5	
	7/23/2001	450	420	---	---	10	11	6.3	33	
	10/23/2001	410	510	550	---	15	1.5	5.7	23	
	1/22/2002	300	330	---	---	66	27	19	84	Sample was flagged. See laboratory analytical report for comments.
	4/25/2002	350	260	<250	---	75	37	18	64	
	7/23/2002	480	100	---	---	100	37	19	63	
	1/29/2003	<50	100	<250	---	<1	<1	<1	<1	
	7/22/2003	180	69	<250	---	50	8	11	26	
	1/20/2004	<50	79	<250	---	4	4	3	6	
	1/18/2005	150	<50	<250	---	26	5.6	15	21.8	

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
		----- pph -----								
MW-2	3/14/1991	98,000	1,800	<500	--	19,000	19,000	2,000	11,000	
	6/13/1991	94,000	15,000	<5,000	--	20,000	24,000	2,400	15,000	
	9/11/1991	69,000	24,000	<500	--	22,000	29,000	2,000	15,000	
	12/11/1991	96,000	23,000	--	--	19,000	29,000	3,600	23,000	
	3/11/1992	320,000	82,000	--	--	11,000	30,000	3,600	29,000	
	6/15/1992	160,000	160,000	--	--	17,000	31,000	3,200	28,000	
	9/18/1992	210,000	52,000	--	--	16,000	40,000	3,300	23,000	
	12/8/1992	720,000	27,000	--	--	14,000	27,000	9,600	37,000	
	3/10/1993	100,000	31,000	--	--	6,400	25,000	2,800	24,000	
	6/4/1993	130,000	14,000	--	--	2,500	12,000	3,100	20,000	
	10/13/1993	120,000	--	--	--	10,000	26,000	2,600	22,000	
	4/11/1994	130,000	--	--	--	6,300	18,000	2,500	23,000	
	10/20/1994	160,000	--	--	--	5,700	25,000	2,700	35,000	
	4/11/1995	61,000	--	--	--	800	6,200	2,800	18,000	
	3/6/1996	120,000	27,000	<5,000	<500	3,900	13,000	2,300	19,000	
	10/18/1996	350,000	13,000	<5,000	<500	4,800	17,000	7,500	49,000	
	4/10/1997	79,000	7,800	<5,000	<500	1,500	9,400	2,400	19,000	
	10/30/1997	98,000	14,000	<20,000	<2,000	1,200	5,100	2,500	18,000	
	4/7/1998	41,000	<50	<50	18,000	340	2,500	1,400	12,000	
	10/7/1998	38,000	3,500	80	42,000	780	1,400	1,600	14,000	
	4/7/1999	31,000	3,600	850	1,700	210	700	510	4,700	
	10/19/1999	140,000	<50	<50	11,000	11,000	360	3,200	8,400	
	4/26/2000	---	---	---	---	---	---	---	---	Well inaccessible.
	10/31/2000	160,000	4,300	<50	---	1,500	3,000	1,200	14,000	
	2/2/2001	64,000	30,000	<25,000	---	2,300	1,600	870	12,000	
	4/23/2001	50,000	30,000	<12,500	---	870	3,800	790	13,000	
	7/23/2001	54,000	21,000	---	---	1,300	2,700	850	13,000	
	10/23/2001	49,000	13,000	<5,000	---	1,300	230	830	9,500	
	1/22/2002	2,500	4,700	---	---	27	34	18	290	Sample was flagged. See laboratory analytical report for comments.
	4/25/2002	14,000	26,000	1,800	---	620	1,300	590	5,300	
	7/23/2002	9,500	11,000	---	---	830	390	290	1,630	
	10/22/2002	28,000	14,000	7,200	---	1,500	240	760	3,400	
	1/28/2003	1,200	4,200	1,200	---	79	29	61	335	
	4/22/2003	200	3,500	1,500	---	45	2	15	20	
	7/22/2003	470	700	430	---	120	13	27	52	
	1/20/2004	330	1,000	600	---	17	7	11	40	
	7/19/2004	230	760	720	---	24	7	7.6	15.3	
	1/18/2005	470	500	290	---	68	15	22	44.4	
	7/12/2005	<100	<50	<250	---	<0.5	<0.5	<0.5	<1.5	

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
		----- ppb -----								
MW-3	3/14/1991	180,000	8,800	<500	--	18,000	28,000	2,700	15,000	
	6/13/1991	--	--	--	--	--	--	--	--	Well was dry.
	9/11/1991	--	--	--	--	--	--	--	--	Well was dry.
	12/11/1991	--	--	--	--	--	--	--	--	Well was dry.
	3/11/1992	82,000	10,000	--	--	21,000	30,000	2,200	14,000	
	6/15/1992	110,000	14,000	--	--	16,000	25,000	2,200	13,000	
	9/18/1992	89,000	14,000	--	--	20,000	20,000	1,800	10,000	
	12/8/1992	90,000	6,500	--	--	18,000	26,000	1,200	11,500	
	3/10/1993	64,000	6,000	--	--	16,000	12,000	1,700	12,000	
	6/4/1993	86,000	9,200	--	--	11,000	18,000	2,200	7,800	
	10/13/1993	--	--	--	--	--	--	--	--	Well inaccessible.
	4/11/1994	120,000	--	--	--	36,000	35,000	1,800	11,000	
	10/20/1994	130,000	--	--	--	18,000	22,000	2,300	12,000	
	4/11/1995	73,000	--	--	--	11,000	6,900	2,900	8,800	
	3/6/1996	110,000	31,000	<5,000	<500	14,000	11,000	2,900	16,000	
	10/18/1996	120,000	18,000	<5,000	<500	12,000	7,300	2,900	15,000	
	4/9/1997	--	--	--	--	--	--	--	--	No sample due to the presence of free-phase hydrocarbon in the well.
	10/29/1997	--	--	--	--	--	--	--	--	No sample due to the presence of free-phase hydrocarbon in the well.
	4/7/1998	29,000	47,000	<50	51,000	12,000	890	2,200	11,000	
	10/7/1998	59,000	2,200	<1,000	3,400	11,000	470	2,700	9,900	
	4/7/1999	280,000	52,000	6,100	18,000	9,700	660	3,400	14,000	
	10/19/1999	170,000	36,000	<50	<50	12,000	560	4,100	11,000	
	4/26/2000	---	---	---	---	---	---	---	---	Well inaccessible.
	10/31/2000	---	---	---	---	---	---	---	---	Well plugged at 7 feet, therefore not sampled.
	2/2/2001	75,000	16,000	<5,000	---	5,500	550	1,800	3,700	
	4/23/2001	---	---	---	---	---	---	---	---	Well inaccessible.
	7/23/2001	29,000	5,100	---	---	5,200	290	1,400	2,200	
	10/23/2001	59,000	5,600	<6,250	---	6,900	230	1,800	2,900	
	1/22/2002	40,000	26,000	---	---	6,800	400	1,800	3,200	Sample was flagged. See laboratory analytical report for comments.
	4/25/2002	18,000	18,000	1,300	---	7,500	200	1,600	2,400	
	7/23/2002	28,000	16,000	---	---	5,500	190	700	970	
	10/22/2002	35,000	7,300	4,800	---	6,400	210	1,600	1,400	
	1/28/2003	16,000	6,900	570	---	2,700	75	1,300	1,521	
	4/22/2003	18,000	54,000	4,900	---	6,000	100	2,100	2,528	
	7/22/2003	22,000	17,000	1,500	---	6,700	140	2,000	2,033	
	1/20/2004	25,000	48,000	4,500	---	7,400	130	1,900	867	
	7/19/2004	30,000	24,000	1,300	---	7,600	180	2,100	1,011	
	1/18/2005	24,000	11,000	760	---	3,800	85	1,500	750	
	7/12/2005	37,000	27,000	1,400	---	7,600	99	1,600	211	

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
		<----- pph ----->								
MW-4	3/14/1991	--	--	--	--	--	--	--	--	Well was dry.
	6/13/1991	--	--	--	--	--	--	--	--	Well was dry.
	9/11/1991	--	--	--	--	--	--	--	--	Well was dry.
	12/11/1991	--	--	--	--	--	--	--	--	Well was dry.
	3/11/1992	--	--	--	--	--	--	--	--	Well inaccessible.
	6/15/1992	--	--	--	--	--	--	--	--	Well was dry.
	9/18/1992	--	--	--	--	--	--	--	--	Well was dry.
	12/8/1992	--	--	--	--	--	--	--	--	Well was dry.
	3/10/1993	--	--	--	--	--	--	--	--	Well was dry.
	6/4/1993	--	--	--	--	--	--	--	--	Well was dry.
	10/13/1993	--	--	--	--	--	--	--	--	Well was dry.
	4/11/1994	--	--	--	--	--	--	--	--	Well was dry.
	10/20/1994	--	--	--	--	--	--	--	--	Well was dry.
	4/11/1995	--	--	--	--	--	--	--	--	Well was dry.
	3/6/1996	820	1,100	<500	<50	280	36	9.3	57	
	10/21/1996	2,500	860	<500	<50	920	0.6	5.9	0.79	
	4/10/1997	840	1,200	1,100	<50	<0.5	1.5	2.6	4	
	10/29/1997	810	810	720	<50	170	2	<0.5	1.6	
	4/8/1998	13,000	<50	150	200	290	<0.5	<0.5	66	
	10/7/1998	2,300	<50	<50	<50	7	<0.5	<0.5	<0.5	
	4/7/1999	<5,000	<50	<100	<50	<50	<50	<50	<50	
	10/19/1999	<500,000	<50	---	<50	<5,000	<5,000	<5,000	<5,000	
	4/26/2000	95,000	310	---	---	11	12	7.5	14	
	10/31/2000	1,900	<50	<50	---	32	4.9	4.9	37	
	2/2/2001	200	370	630	---	23	<0.5	<0.5	<0.5	
	4/23/2001	30,000	460	480	---	<0.5	<0.5	<0.5	<0.5	
	7/23/2001	4,100	600	---	---	25	16	7.7	37	
	10/23/2001	5,500	400	<500	---	0.85	<5	<5	<5	
	1/22/2002	370	79	---	---	20	6.9	4.1	17	Sample was flagged. See laboratory analytical report for comments.
	4/25/2002	140	72	<250	---	20	25	4	18	
	7/23/2002	180	<50	---	---	15	24	4	16	
	10/22/2002	2,600	140	<250	---	120	31	18	75	
	1/27/2003	130	<50	<250	---	47	7	5	23	
	4/22/2003	77	110	<250	---	16	3	3	11	
	7/22/2003	210	160	<250	---	60	11	8	34	
	1/20/2004	62	82	<250	---	9	6	4	11	
	7/19/2004	<50	79	<250	---	<0.5	<0.5	<0.5	<1.5	
	1/18/2005	190	<50	<250	---	30	14	4.7	28.6	
	7/12/2005	<100	<50	<250	---	4.7	0.6	0.9	2.4	

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
		<----- ppb ----->								
MW-5	6/13/1991	<50	<50	<500	--	0.94	1.1	0.5	<0.5	Samples analyzed for Oil and Grease by Standard Methods Method 5520 B&F and were reported as <5,000 ppb.
	9/11/1991	90	<50	<500	--	29	14	5.4	16	Samples analyzed for Oil and Grease by Standard Methods Method 5520 B&F and were reported as <5,000 ppb.
	12/11/1991	<50	<50	--	--	10	7.3	4.1	12	
	3/11/1992	<50	640	--	--	0.9	1.1	<0.5	1.9	
	6/15/1992	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	9/18/1992	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	12/8/1992	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	3/10/1993	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	6/4/1993	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	10/13/1993	70	--	--	--	2.2	3.4	1.4	5.2	
	4/11/1994	<50	--	--	--	<0.5	<0.5	<0.5	<0.5	
	10/20/1994	<50	--	--	--	2.6	3.7	<0.5	<0.5	
	4/11/1995	80	--	--	--	3	6.6	2.6	14	
	3/6/1996	<50	<50	<500	<50	1.2	7.3	0.5	2.4	
	10/18/1996	<50	<50	<500	<50	<0.5	<0.5	<0.5	0.6	
	4/9/1997	<50	70	<500	<50	<0.5	0.7	<0.5	<0.5	
	10/29/1997	<50	<50	<500	<50	<0.5	<0.5	<0.5	<0.5	
	4/7/1998	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/7/1998	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	4/7/1999	<50	<50	<100	<50	<0.5	<0.5	<0.5	<0.5	
	10/19/1999	<50	<50	---	<50	<0.5	<0.5	<0.5	<0.5	
	4/26/2000	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	---	---	---	---	---	---	---	---	Well inaccessible.
	2/2/2001	110	640	910	---	11	4.3	4.6	24	
	10/23/2001	100	200	250	---	8.2	1.3	5	19	
	1/28/2003	72	120	340	---	21	2	5	10	
	5/27/2005	<100	87	290		1.8	<0.5	<0.5	<1.5	
MW-5A	10/18/1996	<50	<50	<500	<50	<0.5	0.6	<0.5	0.6	
	4/10/1997	240	140	<500	<50	16	28	9.9	56	
	10/29/1997	<50	<50	<500	<50	<0.5	<0.5	<0.5	<0.5	
	4/7/1998	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/7/1998	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	4/7/1999	<50	<50	220	<50	<0.5	<0.5	<0.5	<0.5	
	10/19/1999	--	--	--	--	--	--	--	--	Well inaccessible.
	4/26/2000	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	---	---	---	---	---	---	---	---	Well inaccessible.
	2/2/2001	190	410	590	---	18	10	6.8	49	
	10/23/2001	140	110	<250	---	15	1.7	8.5	32	
	1/28/2003	1,500	620	260	---	320	19	83	143	
	5/27/2005	240	9,800	41,000		1.8	<0.5	<0.5	<1.5	

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
		ppb								
MW-7	6/13/1991	<50	<250	4,700	--	<0.5	1.6	1.3	2.9	
	9/11/1991	<50	<50	<500	--	14	7.6	3.5	10	
	12/11/1991	<50	<50	--	--	1.8	1.1	0.8	2.5	
	3/11/1992	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	6/15/1992	120	190	--	--	4.3	3.1	14	24	
	9/18/1992	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	12/8/1992	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	3/10/1993	<50	1,200	--	--	<0.5	<0.5	<0.5	<0.5	
	6/4/1993	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	10/13/1993	500	--	--	--	<0.5	<0.5	2.2	9.6	
	4/11/1994	120	--	--	--	3.6	4.7	1.9	9.1	
	10/20/1994	70	--	--	--	6.9	13	1.9	5.2	
	4/11/1995	50	--	--	--	2.6	6.4	2.7	14	
	3/6/1996	<50	<50	600	<50	<0.5	3.4	<0.5	1	
	10/18/1996	<50	280	<500	<50	<0.5	8.3	<0.5	<0.5	
	4/9/1997	<50	160	<500	<50	<0.5	<0.5	<0.5	<0.5	
	10/29/1997	<50	80	<500	<50	<0.5	1.1	<0.5	1.8	
	4/7/1998	<50	<50	<50	<50	3.9	<0.5	1.7	6.8	
	10/7/1998	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	4/7/1999	<50	130	110	<50	<0.5	<0.5	<0.5	<0.5	
	10/19/1999	<50	<50	--	<50	<0.5	<0.5	<0.5	<0.5	
	4/26/2000	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	12,000	<50	<50	--	3,800	26	79	51	
	4/23/2001	61	92	<250	--	4.9	2.1	1.3	5.2	
	10/23/2001	<50	71	<250	--	<0.5	<0.5	<0.5	<0.5	
	1/27/2003	81	<50	<250	--	21	5	3	15	
	1/20/2004	140	69	350	--	17	21	6	26	
	1/18/2005	140	<50	<250	--	12	11	2.3	19.9	

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
----- ppb -----										
MW-8	6/13/1991	<50	<50	<500	--	<0.5	<0.5	<0.5	<0.5	
	9/11/1991	90	<50	600	--	21	10	4.2	12	
	12/11/1991	<50	<50	--	--	0.9	<0.5	<0.5	0.6	
	3/11/1992	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	6/15/1992	<50	280	--	--	<0.5	<0.5	<0.5	<0.5	
	9/18/1992	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	12/8/1992	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
	3/10/1993	<50	140	--	--	<0.5	<0.5	<0.5	<0.5	
	6/4/1993	<50	100	--	--	<0.5	<0.5	<0.5	<0.5	
	10/13/1993	<50	--	--	--	4.5	7.5	2.2	8.4	
	4/11/1994	<50	--	--	--	2.3	2.4	1	5	
	10/20/1994	110	--	--	--	4.1	5.2	<0.5	0.8	
	4/11/1995	280	--	--	--	24	38	10	57	
	3/6/1996	60	<50	<500	<50	0.7	6.1	<0.5	2.1	
	10/21/1996	<50	290	<500	<50	<0.5	<0.5	<0.5	<0.5	
	4/10/1997	58	260	<500	<50	4.9	10	1.1	7.8	
	10/30/1997	<50	300	<500	<50	<0.5	<0.5	<0.5	<0.5	
	4/8/1998	62	<50	<50	<50	8.4	0.86	2.7	10	
	10/7/1998	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	4/7/1999	<50	<50	380	<50	<0.5	<0.5	<0.5	<0.5	
	10/19/1999	<1,250	<50	--	<50	<13	<13	<13	<13	
	4/26/2000	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	<50	<50	<50	---	<0.5	<0.5	<0.5	<0.5	
	10/23/2001	280	180	<250	---	<0.5	<0.5	<0.5	<0.5	
	1/27/2003	<50	100	<250	---	6	2	<1	6	
MW-9	10/18/1996	110	<50	<500	<50	<1.0	<1.0	<1.0	3.6	
	4/10/1997	74	330	<500	<50	17	1.4	0.77	1.6	
	10/29/1997	140	220	<500	<50	<0.5	<0.5	<0.5	<0.5	
	4/8/1998	82	<50	<50	<50	2.8	0.5	1.5	5.7	
	10/7/1998	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	4/7/1999	<50	<50	190	<50	<0.5	1.1	0.85	1.6	
	10/19/1999	<500	<50	--	<50	<0.5	<0.5	<0.5	<0.5	
	4/26/2000	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	<50	<50	<50	---	<0.5	<0.5	<0.5	<0.5	
	10/23/2001	270	<50	<250	---	<0.5	<0.5	<0.5	<0.5	
	1/27/2003	<50	98	<250	---	10	3	<1	6	
	1/20/2004	<50	100	<250	---	2	9	1	8	
	1/18/2005	140	100	<250	---	18	10	4.7	6.5	
MW-10	4/26/2000	28,000	14,000	---	---	1,000	60	660	1,700	
	10/31/2000	89,000	13,000	<50	---	12,000	480	2,800	11,000	
	2/2/2001	96,000	32,000	<5,000	---	12,000	3,300	2,700	13,000	
	4/23/2001	56,000	47,000	<12,500	---	9,900	1,800	2,400	8,800	

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
		-----> ppb <-----								
MW-10	7/23/2001	78,000	51,000	---	---	13,000	3,400	2,500	12,000	
	10/23/2001	90,000	28,000	9,700	---	17,000	3,600	2,700	12,000	
	1/22/2002	64,000	9,600	---	---	7,200	1,200	2,200	8,200	Sample was flagged. See laboratory analytical report for comments.
	4/25/2002	39,000	19,000	960	---	14,000	5,000	2,600	12,800	
	7/23/2002	59,000	14,00	---	---	11,000	2,400	1,900	9,000	
	10/22/2002	82,000	26,000	16,000	---	12,000	1,700	2,200	9,800	
	1/27/2003	29,000	12,000	960	---	8,800	1,100	1,500	6,100	
	4/22/2003	20,000	6,100	470	---	4,800	500	1,300	5,330	
	7/22/2003	35,000	12,000	870	---	8,800	1,100	1,700	7,100	
	1/20/2004	18,000	4,800	330	---	3,400	230	970	2,870	
	1/18/2005	20,000	15,000	820	---	3,200	170	800	2,410	
MW-11	5/8/2000	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	---	---	---	---	---	---	---	---	
	2/2/2001	---	---	---	---	---	---	---	---	
	5/27/2005	<100	<50			<0.5	<0.5	<0.5	1.1	
MW-12	5/8/2000	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	---	---	---	---	---	---	---	---	
	2/2/2001	---	---	---	---	---	---	---	---	
	5/27/2005	<100	<50			<0.5	<0.5	<0.5	1.4	
MW-13	5/8/2000	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	---	---	---	---	---	---	---	---	
	2/2/2001	---	---	---	---	---	---	---	---	Well was abandoned.
MW-14	5/8/2000	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	---	---	---	---	---	---	---	---	
	2/2/2001	---	---	---	---	---	---	---	---	Well was abandoned.
MW-15	5/8/2000	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	<50	<50	<50	---	<0.5	<0.5	<0.5	<0.5	
	10/23/2001	<50	<50	<294	---	<0.5	<0.5	<0.5	<0.5	
	1/27/2003	<50	<50	<250	---	5	2	<1	5	
	5/27/2005	<100	<50			<0.5	<0.5	<0.5	1.1	
MW-16	5/8/2000	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	<50	<50	<50	---	<0.5	<0.5	<0.5	<0.5	
	10/23/2001	<50	<50	<338	---	<0.5	<0.5	<0.5	<0.5	
	1/27/2003	<50	<50	<250	---	5	2	<1	5	
	5/27/2005	<100	<50			<0.5	<0.5	<0.5	1.1	

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
		----->				----->				
MW-17	5/8/2000	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	<50	<50	<50	---	<0.5	<0.5	<0.5	<0.5	
	10/23/2001	<50	<50	<250	---	<0.5	<0.5	<0.5	<0.5	
	6/7/2005	<50	<50			<0.5	<0.5	<0.5	1.2	
MW-18	5/8/2000	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	<50	<50	<50	---	<0.5	<0.5	<0.5	<0.5	
	10/23/2001	<50	<69	<347	---	<0.5	<0.5	<0.5	<0.5	
	1/27/2003	<50	<50	<250	---	<1	<1	<1	<1	
	5/27/2005	<100	<50			<0.5	<0.5	<0.5	<1.5	
MW-19	5/8/2000	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	<50	<50	<50	---	<0.5	<0.5	<0.5	<0.5	
	10/23/2001	<50	<50	<329	---	<0.5	<0.5	<0.5	<0.5	
	5/27/2005	<100	<50			<0.5	<0.5	<0.5	<1.5	
MW-20	6/8/2000	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	<50	<50	<50	---	<0.5	<0.5	<0.5	<0.5	
	10/23/2001	<50	<50	<250	---	0.6	1.2	<0.5	<0.5	
	5/27/2005	<100	<50			<0.5	<0.5	<0.5	<1.5	
V-1	6/13/1991	78,000	9,600	<2,500	---	15,000	13,000	1,800	12,000	
	9/11/1991	150,000	180,000	<500	---	16,000	17,000	1,800	16,000	
	12/11/1991	---	---	---	---	---	---	---	---	Well was dry.
	3/11/1992	210,000	42,000	---	---	8,600	16,000	2,500	15,000	
	6/15/1992	59,000	31,000	---	---	8,800	9,800	2,200	12,000	
	9/18/1992	150,000	110,000	---	---	9,300	7,900	1,100	17,000	
	12/8/1992	74,000	30,000	---	---	12,000	3,100	640	9,400	
	3/10/1993	56,000	11,000	---	---	8,300	21,000	2,300	26,000	
	6/4/1993	29,000	8,300	---	---	3,200	2,900	640	7,100	
	10/14/1993	82,000	---	---	---	7,300	2,700	1,300	12,000	
	4/11/1994	62,000	---	---	---	9,600	630	1,800	12,000	
	10/20/1994	51,000	---	---	---	6,000	270	1,000	8,900	
	4/11/1995	37,000	---	---	---	5,900	290	1,400	7,800	
	3/6/1996	46,000	20,000	<5,000	<500	6,800	310	1,900	7,300	
	10/18/1996	29,000	38,000	25,000	<1,000	4,700	<100	1,200	3,700	
	4/9/1997	27,000	8,100	<5,000	<500	3,900	77	1,800	5,200	
	10/29/1997	---	---	---	---	---	---	---	---	No sample due to the presence of free-phase hydrocarbon in the well.
	4/7/1998	22,000	2,900	<50	<50	2,900	140	980	1,900	
	10/7/1998	47,000	1,200	<1,000	1,200	2,000	44	1,200	1,500	
	4/7/1999	19,000	15,000	5,600	4,300	1,500	22	1,000	1,100	
	10/19/1999	14,000	<50	<50	3,200	880	<50	690	630	
	4/26/2000	12,000	1,700	---	---	910	28	840	610	
	10/31/2000	19,000	3,000	<50	---	3,200	<12.0	1,600	640	
	2/26/2001	6,800	2,800	1,300	---	430	<25	490	260	
	4/23/2001	7,600	3,300	1,600	---	1,400	17	690	330	

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
<----- ppb ----->										
V-1	7/23/2001	10,000	2,900	---	---	2,300	17	940	230	
	10/23/2001	11,000	2,300	1,400	---	2,800	<50	110	240	
	1/22/2002	12,000	2,600	---	---	2,500	50	1,100	480	Sample was flagged. See laboratory analytical report for comments.
	4/25/2002	4,100	4,900	1,600	---	1,700	21	540	180	
	7/23/2002	6,700	4,100	---	---	1,400	29	240	139	
	1/28/2003	2,200	4,800	2,200	---	310	5	100	24	
	7/22/2003	4,000	4,200	1,000	---	940	10	130	46	
	5/27/2005	3,300	1,000	---	---	150	1.3	15	8.1	
V-2	6/13/1991	--	--	--	--	--	--	--	--	Well was dry.
	9/11/1991	--	--	--	--	--	--	--	--	Well was dry.
	12/11/1991	--	--	--	--	--	--	--	--	Well was dry.
	3/11/1992	55,000	4,000	--	--	16,000	2,100	620	1,500	
	6/15/1992	--	--	--	--	--	--	--	--	This well did not contain sufficient water for sampling.
	9/18/1992	--	--	--	--	--	--	--	--	Well was dry.
	12/8/1992	19,000	5,100	--	--	7,300	160	<5	350	
	3/10/1993	25,000	3,200	--	--	3,800	20	140	67	
	6/4/1993	33,000	3,800	--	--	6,100	41	100	91	
	10/13/1993	--	--	--	--	--	--	--	--	Well was dry.
	4/11/1994	32,000	--	--	--	4,000	18	30	20	
	10/20/1994	--	--	--	--	--	--	--	--	Well was dry.
	4/11/1995	34,000	--	--	--	2,200	19	150	21	
	3/6/1996	<5,000	<100	3,400	<100	430	<50	<50	110	
	10/18/1996	100,000	12,000	14,000	<1,000	1,800	1,200	530	2,000	
	4/9/1997	6,200	11,000	11,000	<1,000	2,800	19	76	12	
	10/30/1997	8,000	9,800	9,600	<250	3,400	22	58	13	
	4/7/1998	6,700	500	<50	<50	2,600	24	50	74	
	10/7/1998	5,000	1,000	<50	460	1,800	11	18	9.2	
	4/7/1999	8,100	5,400	1,300	<100	1,600	<50	<50	<50	
	10/19/1999	210,000	<50	<50	260	1,500	<500	1,200	6,900	
	4/26/2000	39,000	610	---	---	450	11	24	12	
	10/31/2000	170	4,700	<50	---	10	1.5	6.9	22	
	2/26/2001	43,000	9,800	<5,000	---	4,200	64	97	<50	
	4/23/2001	31,000	610,000	<166,500	---	2,000	<100	160	<100	
	7/23/2001	---	---	---	---	---	---	---	---	Well no longer sampled. It has been switched to a SVE (soil vapor extraction) well.

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
<----- ppb ----->										
DW-1	6/13/1991	790	280	<500	--	390	14	16	34	Samples analyzed for Oil and Grease by Standard Methods Method 5520 B&F and were reported as <5,000 ppb.
	9/11/1991	660	<50	<500	--	340	7.5	6.6	19	
	9/11/1991	--	--	--	--	--	--	--	--	
	12/11/1991	200	4,700	--	--	23	<0.5	0.6	2.2	Well was abandoned.
DW-2	3/6/1996	<50	<50	--	--	5.4	<0.5	<0.5	<0.5	
	10/21/1996	57	<50	--	--	17	<0.5	<0.5	0.5	
	4/10/1997	<50	60	<500	<50	18	<0.5	<0.5	0.6	
	10/30/1997	65	--	--	--	24	<0.5	<0.5	0.6	
	4/8/1998	<50	<50	<50	<50	19	<0.5	<0.5	<0.5	
	10/7/1998	93	<50	<50	<50	19	<0.5	<0.5	<0.5	
	4/7/1999	<500	110	100	<50	<0.5	5.9	<0.5	<0.5	
	8/30/1999	---	---	---	---	---	---	---	---	Well was abandoned.
DW-468	4/2/1998	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	7/31/1998	<50	<50	<50	<50	<0.5	<0.5	<0.5	<0.5	
	10/7/1998	<50	--	--	--	<0.5	<0.5	<0.5	<0.5	
	4/7/1999	<50	--	--	--	<0.5	<0.5	<0.5	<0.5	
	10/19/1999	<50	--	--	--	<0.5	<0.5	<0.5	<0.5	
	4/26/2000	<50	---	---	---	<0.5	<0.5	<0.5	<0.5	
	5/26/2000	<50	---	---	---	<0.5	<0.5	<0.5	<0.5	
	6/26/2000	<50	---	---	---	<0.5	<0.5	<0.5	<0.5	
	7/21/2000	<50	---	---	---	<0.5	<0.5	<0.5	<0.5	
	8/29/2000	<50	---	---	---	<0.5	<0.5	<0.5	<0.5	
	10/2/2000	<50	---	---	---	<0.5	<0.5	<0.5	<0.5	
	10/31/2000	<50	---	---	---	<0.5	<0.5	<0.5	<0.5	
	11/30/2000	<50	---	---	---	<0.5	<0.5	<0.5	<0.5	
	12/19/2000	<50	---	---	---	<0.5	<0.5	<0.5	<0.5	
	2/2/2001	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	Well has been taken out of service.
AQU-2	5/27/2005	<100	<50	--	--	<0.5	0.6	0.5	3.0	
G1	4/16/1996	<50	<50	--	--	<0.5	<0.5	<0.5	<0.5	
G2	4/16/1996	<50	<50	---	---	<0.5	1.1	<0.5	1	
G3	4/16/1996	<50	160	---	---	0.7	1.4	<0.5	1.2	
G4	4/16/1996	<50	960	---	---	<0.5	<0.5	<0.5	<0.5	
G6/MW-10	4/16/1996	----	----	---	---	----	----	----	----	
G76	4/16/1996	----	----	--	--	----	----	----	----	

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
<----- ppb ----->										
G8	4/16/1996	70	350	---	---	1	<0.5	<0.5	0.8	
G9	4/16/1996	<50	1,400	---	---	<0.5	<0.5	<0.5	<0.5	
G10	4/16/1996	<25,000	74,000	---	---	210	41	30.0	140	
G11	4/15/1998	<50	290	---	---	<0.5	<0.5	<0.5	0.69	
G12	4/15/1998	<50	190	---	---	<0.5	<0.5	<0.5	<0.5	
G13	4/15/1998	<50	190	--	--	<0.5	<0.5	<0.5	<0.5	
G14	4/15/1998	<50	190	---	---	<0.5	<0.5	<0.5	---	
G15	4/15/1998	81	<50	---	---	<0.5	<0.5	<0.5	---	
G16	4/15/1998	<50	<50	---	---	<0.5	<0.5	<0.5	---	
G17	4/15/1998	<50	<50	---	<0.5	<0.5	<0.5	<0.5	---	
G-18	9/11/1998	<50	--	--	--	<0.5	<0.5	<0.5	<1	
G-19	9/11/1998	--	--	--	--	--	--	--	--	
G-20	9/11/1998	<50	--	--	--	<0.5	<0.5	<0.5	<1	
G-21	9/11/1998	--	--	--	--	--	--	--	--	
TSP-1@29'	5/3/2000	44,000	---	---	---	7,400	1,300	1600.0	6,800	
TSP-1@38'	5/3/2000	68,000	51,000	---	---	3,400	6,600	2000.0	12,000	
TSP-2@33'	5/1/2000	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	
TSP-2@48'	5/1/2000	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	
TSP-2@62'	5/2/2000	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	
TSP-3@30'	5/2/2000	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	
TSP-3@65'	5/3/2000	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	
TSP-4@40'	5/2/2000	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	
TSP-5@50'	5/3/2000	<50	<50	---	---	<0.5	<0.5	<0.5	<0.5	

Table 3. Analytic Results for Ground Water - Organic Compounds - Redwood Oil Bulk Plant, 455 Yolanda, Santa Rosa

Sample ID	Date Sampled	TPPH (G)	TPH (D)	TPH (MO)	TPH (K)	Benzene	Toluene	Ethyl benzene	Xylenes	Notes
		<----- ppb ----->								

EXPLANATION:

TPPH(G) = Total Purgeable Petroleum Hydrocarbons as Gasoline

TPH(D) = Total Petroleum Hydrocarbons as Diesel

TPH(K) = Total Petroleum Hydrocarbons as Kerosene

TPH (MO) = Diesel-range Motor Oil

ppb = parts per billion

-- = Not analyzed/Not applicable

ND = Not detected (see note)